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Summary Report of Mission Acceleration Measurements for STS–66

Launched November 3, 1994

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ABSTRACT

Experiments flown in the middeck of Atlantis during the STS-66 mission were supported by the Space Acceleration Measurement System (SAMS). In particular, the three triaxial SAMS sensor heads collected data in support of protein crystal growth experiments. Data collected during STS-66 are reviewed in this report. The STS-66 SAMS data represent the microgravity environment in the 0.01 Hz to 10 Hz range. Variations in the environment related to differing levels of crew activity are discussed in the report. A comparison is made among times when the crew was quiet during a public affairs conference, working quietly, and exercising. These levels of activity are also compared to levels recorded by a SAMS unit in the Spacelab on Columbia during the STS-65 mission.

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ACRONYM LIST

ATLAS-3	third Atmospheric Laboratory for Applications and Science
CRISTA	Cryogenic Infrared Spectrometer Telescope for Atmosphere
DSO	Detailed Supplementary Objective
DTO	Development Test Objective
GMT	Greenwich Mean Time (day/hour:minute:second)
HPP-2	Heat Pipe Performance-2 Experiment
ILRD	interlimb resistance device
IML-2	second International Microgravity Laboratory
LeRC	NASA Lewis Research Center
MET	Mission Elapsed Time (day/hour:minute:second)
OMS	Orbital Maneuvering System
PCG-STES	Protein Crystal Growth-Single Locker
PCG-TES	Protein Crystal Growth-Thermal Enclosure
PIMS	Principal Investigator Microgravity Services
PSD	power spectral density
rms	root-mean-square
SAMS	Space Acceleration Measurement System
UOF	User Operations Facility
X_A, Y_A, Z_A	SAMS sensor head A axes
X_B, Y_B, Z_B	SAMS sensor head B axes
X_C, Y_C, Z_C	SAMS sensor head C axes
X_0, Y_0, Z_0	Orbiter structural coordinate system axes
X_b, Y_b, Z_b	Orbiter body coordinate system axes

SUMMARY REPORT OF MISSION ACCELERATION MEASUREMENTS FOR STS-66

1. Introduction and Purpose

Fluid physics, materials sciences, combustion, fundamental sciences, and life sciences experiments are conducted on the NASA Space Shuttle Orbiters to take advantage of the reduced gravity environment resulting from the continuous free fall state of low earth orbit. Accelerometer systems are flown on the Orbiters to record the microgravity environment which is composed of quasi-steady accelerations and vibrations of the Orbiter, equipment, and local structures.

The third Atmospheric Laboratory for Applications and Science (ATLAS-3) payload flew on the Orbiter Atlantis on mission STS-66 in November 1994. The ATLAS-3 payload on STS-66 studied the energy of the sun and how it affects the Earth's climate and environment. Two protein crystal growth experiments were operated in the middeck: Protein Crystal Growth-Thermal Enclosure (PCG-TES) and Protein Crystal Growth-Single Locker (PCG-STES). The NASA Lewis Research Center (LeRC) managed Space Acceleration Measurement System (SAMS) recorded acceleration data in the middeck to support the protein crystal growth experiments.

The Principal Investigator Microgravity Services (PIMS) project at NASA LeRC supports principal investigators of microgravity experiments as they evaluate the effects of varying acceleration levels on their experiments. This report is provided by PIMS to furnish interested experiment investigators with a guide to evaluating the acceleration environment during STS-66 and as a means of identifying areas which require further study. To achieve this purpose, various pieces of information are presented. Section 2 of this report provides an overview of the STS-66 payloads and the experiments manifested on the payloads. Section 3 describes the SAMS unit flown on STS-66. Section 4 discusses some specific analysis of the accelerometer data in relation to the various activities which occurred during the mission. Appendix A describes how SAMS data can be accessed through the internet. Appendices B and C contain SAMS data plots to provide an overview of the microgravity environment during the entire mission. Appendix D contains a user comment sheet. Users are encouraged to complete this form and return it to the authors.

2. Mission Overview

At 11:59:43 am EST on 3 November 1994 the Space Shuttle Atlantis launched on the STS-66 mission from NASA Kennedy Space Center. Landing was at Edwards Air Force Base on 14 November at 10:33:45 am EST. In terms of other time conventions used in this report, launch was at Greenwich Mean Time (GMT) 307/16:59:43 or Mission Elapsed Time (MET) 000/00:00 and landing was at GMT 318/15:33:45 or MET 10/22:34:02. Both GMT and MET are recorded in day/hour:minute:second format. The primary objective of the STS-66 mission

was to perform science experiments using the ATLAS-3 primary payload. The ATLAS-3 experiments studied the Northern Hemisphere's middle atmosphere and investigated the Antarctic ozone hole.

During STS-66, the Cryogenic Infrared Spectrometer Telescope for Atmosphere, or CRISTA, payload explored the variability of the atmosphere and provided measurements that will complement those obtained by the Upper Atmosphere Research Satellite launched aboard Discovery in 1991. CRISTA is a joint U.S./German experiment that was deployed from the cargo bay and later retrieved and returned to the cargo bay. Other payloads in the Atlantis cargo bay were the Shuttle Solar Backscatter Ultraviolet payload and the Experiment on the Sun Complementing ATLAS. Payloads located in the middeck were the Physiological & Anatomical Rodent Experiment, PCG-TES, PCG-STES, Space Tissue Loss/National Institute of Health, SAMS, and the Heat Pipe Performance-2 Experiment (HPP-2). Seventeen development test objectives (DTO) and sixteen detailed supplementary objectives (DSO) were performed on STS-66; they are listed in Tables 1 and 2.

3. Space Acceleration Measurement System

The Space Acceleration Measurement System measured the microgravity environment of the Orbiter Atlantis during the STS-66 mission. SAMS was developed to measure the low-gravity environment of Orbiters in support of science payloads sponsored by the NASA Headquarters Microgravity Science and Applications Division [1-4]. STS-66 marked the eleventh shuttle flight of a SAMS unit; one SAMS unit is used to collect data on the Mir space station.

3.1 SAMS STS-66 Configuration

A SAMS unit typically consists of three remote triaxial sensor heads, connecting cables, and a controlling data acquisition unit with a digital data recording system using write once, read many optical disks with 200 megabytes of storage capacity per side. On STS-66, a SAMS unit and three remote triaxial sensor heads were located in the Orbiter middeck in support of protein crystal growth experiments. All three sensor heads recorded data at 50 samples per second after lowpass filters were applied to the data with cutoffs at 10 Hz. The sign convention used when reporting SAMS data is such that when there is a forward acceleration of the Orbiter (such as the OMS firing), then this is reported as a positive X_b (negative X_0) acceleration, where the subscript b denotes the Orbiter body coordinate system and the subscript 0 denotes the Orbiter structural coordinate system. The locations and orientations of the SAMS heads, with respect to the Orbiter structural coordinate system, are given in Table 3 and Fig. 1.

3.2 SAMS STS-66 Performance

On STS-66, 1.02 gigabytes of SAMS data, representing the middeck microgravity environment, are available between MET 000/16:00 and 010/08:00. The raw SAMS data were processed to correct for pre-mission bias calibration offsets and to compensate for temperature and gain related errors of bias, scale factor, and axis misalignment. The data were orthogonally transformed from the SAMS TSH coordinate system to the Orbiter structural coordinate system. SAMS data for STS-66 are available on CD-ROM from the PIMS group at LeRC. Appendix A describes how these data can be accessed via the internet.

4. Atlantis Microgravity Environment–STS-66

The acceleration environment measured by an accelerometer system on the Orbiter is contributed to by numerous sources. All ongoing operations of crew life support systems and activities and operations of the Orbiter, crew, carrier and experiments tend to have vibratory and/ or oscillatory components that contribute to the background acceleration environment. In this report we are concerned with the identification of activities and the contributions to the acceleration environment. The Appendices provide an overview of the microgravity environment during the STS-66 mission. Appendix B shows time history plots of SAMS Head A (10 Hz filter) data. Appendix C provides a frequency domain representation of the SAMS Head A data. The remainder of this section discusses the environment related to varying levels of crew activity. The overall microgravity environment of this mission is also compared to the environment during a mission dedicated to microgravity experiments.

4.1 Crew Activity

The six member crew of STS-66 worked on a dual shift schedule, with their activities confined to the middeck and flight deck areas. For this mission configuration, several examples of the environment related to crew activity are explained in the remainder of this section.

4.1.1 PAO Event

Fig. 2 shows an example of the vibration environment of the middeck as recorded by SAMS during a period when the entire crew was participating in a public affairs conference. All crew members were quietly situated in the flight deck for this time. This is a typical activity for a mission and the time was confirmed by downlink video. The data plots in column a) of Fig. 2 are time histories of the three axes of SAMS Head A data from MET 004/20:10:00 to 004/20:15:27. The data plots in column b) of Fig. 2 show power spectral density (PSD) representations of the column a) data. For each axis the PSD is calculated according to Parseval's theorem to give an indication of the frequency distribution of power in the acceleration signal.

4.1.2 Crew Working Quietly

During STS-66, the crew noted two times during which they made a concerted effort to work quietly (MET 2/03:00-2/05:00 and 4/00:00-4/04:30). This activity was performed to demonstrate to experiment investigators that quiet microgravity conditions can be maintained even as the crew is working. A summary of the microgravity environment during these time periods is provided by Figs. B-21, B-22, B-44, B-45, C-11, C-12, and C-23. Comparison of these plots to other survey plots in the Appendices shows that the environment during these times was somewhat reduced. A shift in the mean acceleration at MET 002/04:05 is under investigation at this time, but is not considered to be related to crew activity. An increase in acceleration rms level at MET 004/00:25, also seen in the color spectrogram C-23, appears to be related to Mission Specialist 2 exercising on the ergometer in the flight deck. Fig. 3 shows SAMS Head A data for a five minute period starting at MET 002/04:00. This figure shows the environment per Orbiter axis during this limited section of a quiet work period.

4.1.3 Nominal Activity

Fig. 4 shows SAMS Head A data for an eleven minute period of nominal crew activity starting at MET 009/06:19. The members of one crew shift were asleep while the members of the other crew were performing daily activities, conducting experiments, but not exercising.

4.1.4 Crew Member Touching SAMS Head A

During a video crew conference, the SAMS team in the LeRC User Operations Facility noticed that a crew member touched the SAMS Head A box a few times between 004/20:24 and 004/20:25. Fig. 5 shows SAMS Head A data for an eleven minute period starting at 004/ 20:19:02. The PIMS team is currently attempting to correlate the spikes in this data window with the recorded downlink video of the crew conference. Note that the acceleration transients in this time window are of relatively low magnitude, compared to the on-going crew exercise excitation discussed in section 4.1.5, and the direct contact with the SAMS head does not excite Orbiter structural modes that propagate throughout the Orbiter.

4.1.5 Crew Exercise

Crew exercise on STS-66 was performed with two separate systems: the bicycle ergometer and the interlimb resistance device (ILRD). A list of crew exercise times is given in Table 4. The ergometer was used hard-mounted to the flight deck during HPP-2 experiment operations (~ MET 002/12 to 006/18). At other times the ergometer was hard-mounted to the middeck. The vibration environment related to ergometer exercise is consistent with that

observed on previous missions. Ergometer exercise is characterized by excitation of frequency components related to the pedalling frequency of the crew member. Fig. 6 shows SAMS Head A data taken when the Pilot was exercising on the hard-mounted ergometer in the flight deck (MET 003/20:18:00).

The ILRD provides variable resistance exercise, using the resistance of one limb against another. To use the ILRD, the crew used bungee tethers to suspend a low-mass harness in the middle of the middeck. The crew member was then secured in the harness and exercised. SAMS Head A data shown in Fig. 7 (MET 009/05:28:00) indicate that both the non-dynamic nature of the resistance exercise and the isolation afforded by the tether system meant that the ILRD contributed very little disturbance to the microgravity environment.

4.2 Comparison with STS-65 Microgravity Environment

The microgravity environment of the STS-65 mission is discussed in a report in print [6]. The STS-65 crew worked on a dual-shift schedule. The primary payload was the second International Microgravity Laboratory (IML-2) which was dedicated to microgravity experiments. Performance of the IML-2 experiments required a low-level microgravity environment that was achieved by orbiting in a stable gravity gradient attitude to minimize thruster firings. During some experiment operations, thruster activity was completely inhibited but the crew was required to perform the experiments, so crew activity could not be completely restricted.

Figs. 8-10 show the microgravity environment related to various activities on STS-65. The STS-65 SAMS data presented here were collected in the Spacelab module at fifty samples per second after a 10 Hz lowpass filter was applied to the data. Fig. 8 data represent the environment when the entire crew was in the flight deck for a public affairs conference. Fig. 9 data represent the environment when nominal IML-2 experiment operations were ongoing in the Spacelab module. Fig. 10 data represent the environment when a crew member was exercising on an isolated ergometer in the middeck.

The STS-65 environment may be compared to the STS-66 environment discussed in 4.1. Fig. 11 shows the cumulative RMS acceleration levels versus frequency up to 10 Hz for all the STS-66 and STS-65 events presented here. The variability of the microgravity environment is related to the combined effect of crew activity, experiment operations, and Orbiter operations. Note that significant steps in the cumulative rms plot represent the increases in acceleration power content at a particular frequency. With the exception of the STS-66 crew public affairs conference, the STS-65 isolated exercise and the STS-66 hardmounted exercise, the microgravity environments of the middeck of Atlantis on STS-66 and the Spacelab of Columbia on STS-65 are comparable for the frequency range 0.05 to 10 Hz.

5. Summary

This report serves as a road map to the SAMS data acquired in the middeck of Atlantis during the STS-66 mission. Further analysis of specific events and comparisons with other missions will be performed and published in future documents.

The primary payload on the STS-66 mission was ATLAS-3 with experiments which studied the Northern Hemisphere's middle atmosphere and investigated the Antarctic ozone hole. Other payloads on STS-66 were the Cryogenic Infrared Spectrometer Telescope for Atmosphere payload, the Shuttle Solar Backscatter Ultraviolet payload, and the Experiment on the Sun Complementing ATLAS. Payloads located in the middeck were the Physiological & Anatomical Rodent Experiment, Protein Crystal Growth-Thermal Enclosure, Protein Crystal Growth-Single Locker, Space Tissue Loss/National Institute of Health SAMS, and the Heat Pipe Performance-2 Experiment. The SAMS unit installed in the middeck had three triaxial sensor heads mounted near experiments in and on middeck lockers.

A range of crew activity levels was documented during the mission. and the microgravity environment that existed during these activities is summarized. The environment was also compared to that experienced in the Spacelab module during STS-65. The variability of the microgravity environment evident on both of these missions is related to the combined effect of crew activity, experiment operations, and Orbiter operations.

A summary of the vector magnitude rms and average accelerations for the entire mission was produced for the SAMS Head A (10 Hz) data. Spectrograms were also produced to give a frequency domain summary for the entire mission. These plots are presented in the Appendices B and C.

6. References

[1] DeLombard, R., B. D. Finley, Space Acceleration Measurement System description and operations on the First Spacelab Life Sciences Mission. NASA Technical Memorandum 105301, November 1991.

[2] DeLombard, R., B. D. Finley, and C. R. Baugher, Development of and flight results from the Space Acceleration Measurement System (SAMS). NASA Technical Memorandum 105662, January 1992.

[3] Baugher, C. R., G. L. Martin, and R. DeLombard, Low-frequency vibration environment for five shuttle missions. NASA Technical Memorandum 106059, March 1993.

[4] Rogers, M. J. B., C. R. Baugher, R. C. Blanchard, R. DeLombard, W. W. Durgin, D. H. Matthiesen, W. Neupert, and P. Roussel, A comparison of low-gravity measurements onboard Columbia during STS-40. Microgravity Science and Technology VI/3 (1993) 207-216.

[5] Crew exercise times were provided by S. Parazynski and J. Ruhnke, NASA JSC Astronaut Office, Houston, Texas.

[6] Rogers, M. J. B. and R. DeLombard, Summary report of mission acceleration measurements for STS-65. NASA Technical Memorandum 106871, March 1995.

Table 1. STS-66 Development Test Objectives

DTO	Description
254	Subsonic Aerodynamics Verification (part 2)
301D	Ascent Structural Capability Evaluation
307D	Entry Structural Capability Evaluation
312	External Tank Thermal Protection System Performance
414	Auxiliary Power Unit Shutdown Test (sequence A)
623	Cabin Air Monitoring
664	Cabin Temperature Survey
668	Advanced Lower Body Restraint Test
677	Evaluation of Microbial Capture Device in Microgravity
680	On Orbit Fit Check of the Recumbent Seating System on OV-104
683	Interlimb Resistance Device Evaluation
700-2	Laser Range and Range Rate Device
700-7	Orbiter Data for Real Time Navigation Evaluation
805	Crosswind Landing Performance
834	Notch Filter
835	Mir Approach Demonstration
836	Tools for Rendezvous and Docking

Table 2. STS-66 Detailed Supplementary Objectives

DSO	Description
484B	Circadian Shifting in Astronauts by Bright Light
485	Inter Mars Tissue Equivalent Proportional Counter
487	Immunological Assessment of Crewmembers
493	Monitoring Latent Virus Reactivation and Shedding in Astronauts
603	Orthostatic Function During Entry, Landing and Egress
604	Visual-Vestibular Integration as a Function of Adaptation
605	Postflight Recovery of Postural Equilibrium Control
608	Effects of Space Flight on Aerobic and Anaerobic Metabolism During Exercise
612	Energy Utilization
614B	The Effect of Prolonged Space Flight on Head and Gaze Stability During Locomotion
621	In-Flight Use of Florines to Improve Orthostatic Intolerance Postflight
624	Pre and Postflight Measurement of Cardiorespiratory Responses to Submaximal Exercise
626	Cardiovascular and Cerebrovascular Responses to Standing Before and After Space Flight
901	Documentary Television
902	Documentary Motion Picture Photography
903	Documentary Still Photography

Table 3. STS-66 SAMS Head Location and Orientation

Unit A Head A (TSH-A)

Serial no.: 821-7 — Sample Rate: 50 samples/second

Location: Bolted to Locker Door MF28E — Frequency: 0 to 10 Hz

ORIENTATION		LOCATION
Orbiter Structural Axis	**Sensor Axis**	**Structural Axis**
X_0	$-X_A$	$X_0 = 441.5$ in
Y_0	$-Y_A$	$Y_0 = -27.7$ in
Z_0	Z_A	$Z_0 = 383.2$ in

Unit A Head B (TSH-B)

Serial no.: 821-28 — Sample Rate: 50 samples/second

Location: Taped to Left Side of Locker Door MF43C — Frequency: 0 to 10 Hz

ORIENTATION		LOCATION
Orbiter Structural Axis	**Sensor Axis**	**Structural Axis**
X_0	$-X_B$	$X_0 = 439.9$ in
Y_0	$-Y_B$	$Y_0 = -14.8$ in
Z_0	Z_B	$Z_0 = 394.3$ in

Unit A Head C (TSH-C)

Serial no.: 821-32 — Sample Rate: 50 samples/second

Location: Bolted to Right Side of Locker Door MF43C — Frequency: 0 to 10 Hz

ORIENTATION		LOCATION
Orbiter Structural Axis	**Sensor Axis**	**Structural Axis**
X_0	$-X_C$	$X_0 = 439.9$ in
Y_0	$-Y_C$	$Y_0 = -3.7$ in
Z_0	Z_C	$Z_0 = 394.3$ in

Table 4. STS-66 Crew Exercise Log [5]

MET	Device	Duration	Location
1/03:00	Ergometer	45 min.	Middeck
1/05:30	Ergometer	20 min.	Middeck
1/21:15	ILRD	90 min.	Middeck
2/06:40	Ergometer	20 min.	Middeck
2/22:00	Ergometer	45 min.	Flight Deck
3/05:45	Ergometer	15 min.	Flight Deck
3/13:41	Ergometer	?	Flight Deck
3/15:01?	Ergometer ?	?	Flight Deck
3/20:13	Ergometer	?	Flight Deck
3/23:00	Ergometer	15 min.	Flight Deck
4/00:00	Ergometer	55 min.	Flight Deck
4/23:00	Ergometer	25 min.	Flight Deck
5/16:00	Ergometer	30 min.	Flight Deck
6/02:00	Ergometer	45 min.	Flight Deck
6/20:00	Ergometer	105 min. ?	Middeck
7/01:00	Ergometer	20 min.	Middeck
8/03:00	Ergometer	20 min.	Middeck
8/21:00	Ergometer	35 min.	Middeck
9/05:00	ILRD	60 min.	Middeck
10/00:25	Ergometer	55 min.	Middeck
10/01:15	Ergometer	60 min.	Middeck
10/03:45	Ergometer	40 min.	Middeck

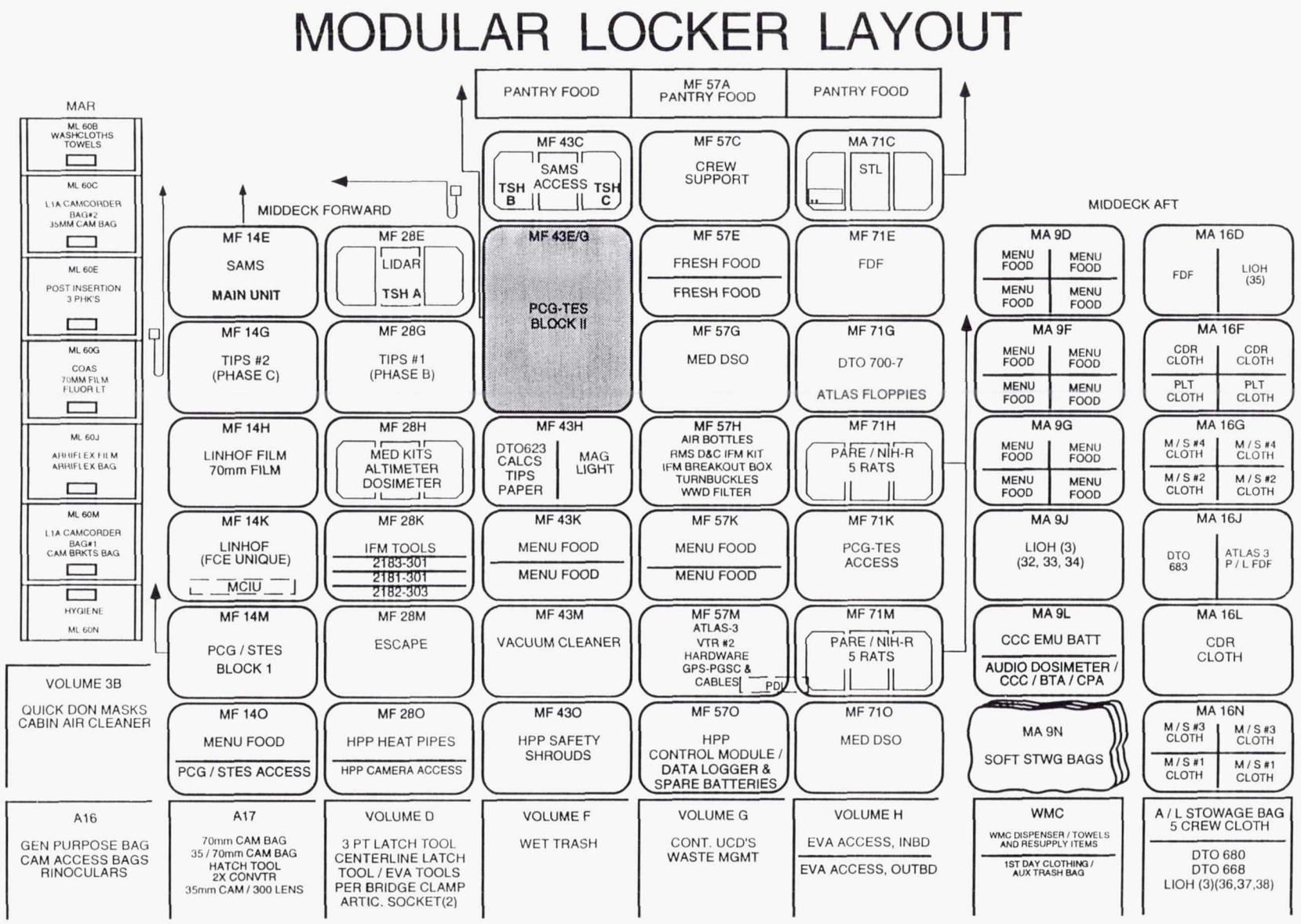

Fig. 1 STS-66 SAMS Head Location and Orientation

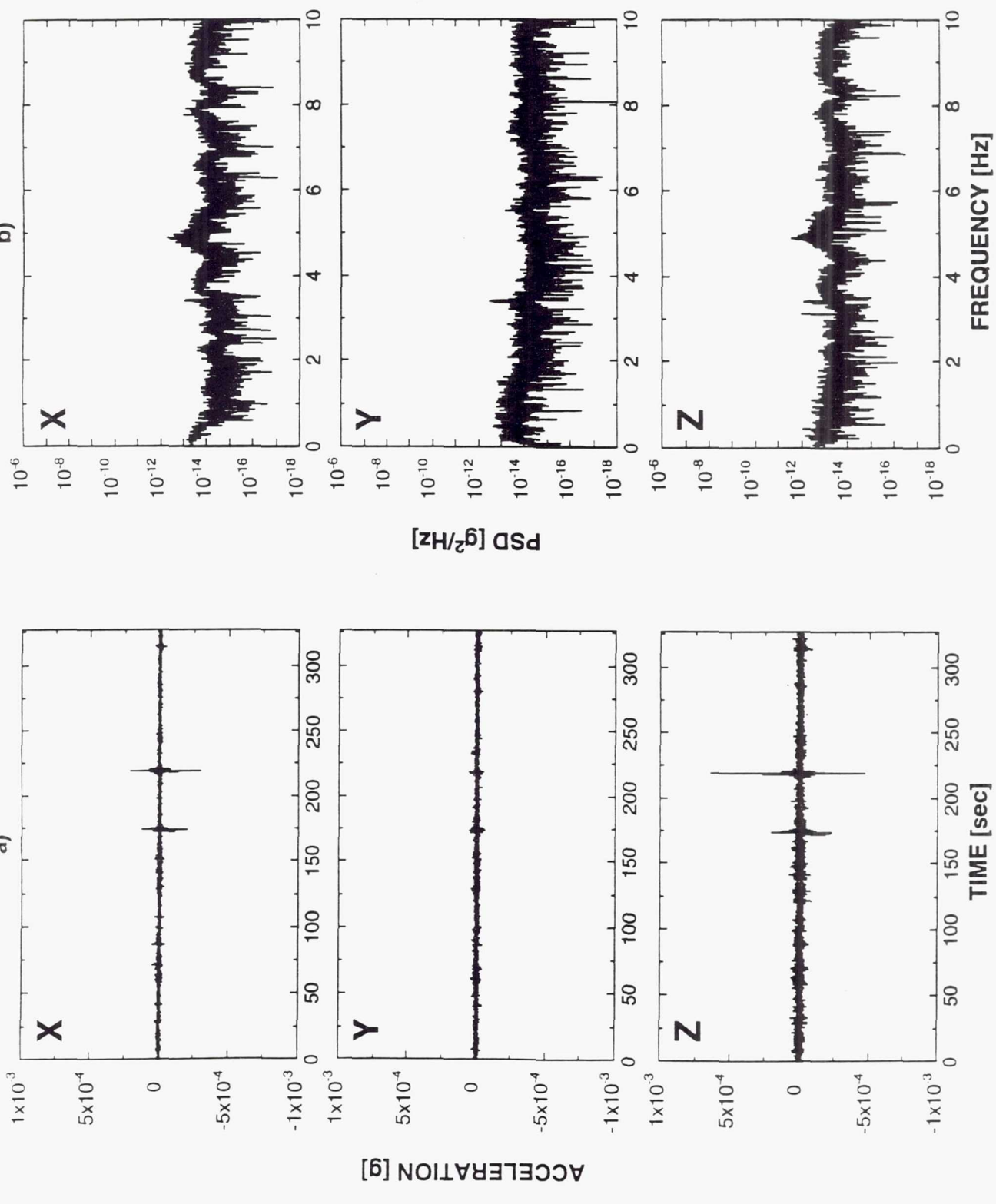

Fig. 2 SAMS Head A data starting at MET 004/20:09:59.999, STS-66, entire crew in Flight Deck. Column a) acceleration vs. time, column b) power spectral density vs. frequency.

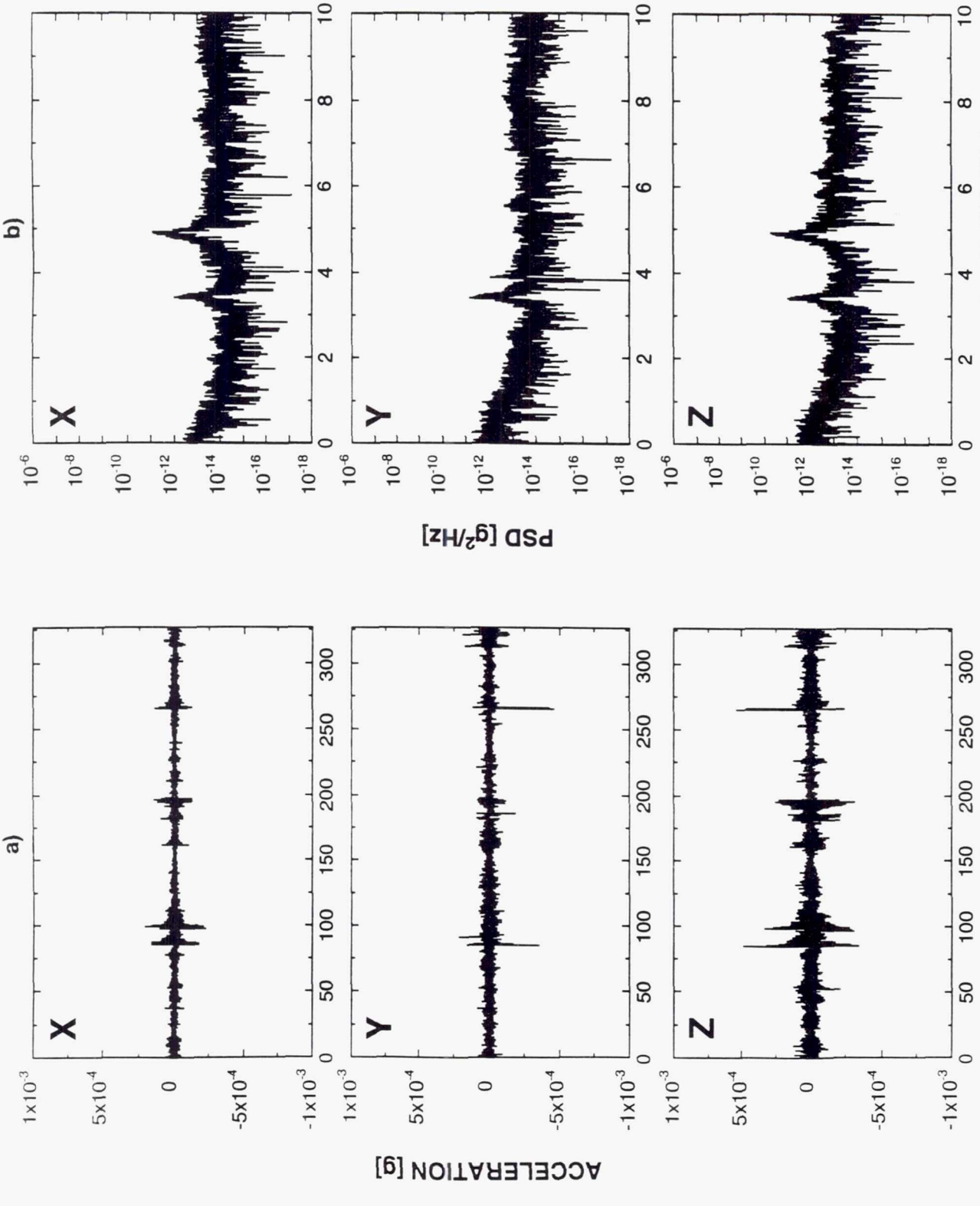

Fig. 3 SAMS Head A data starting at MET 002/04:00:00.645, STS-66, one shift asleep, one shift working quietly. Column a) acceleration vs. time, column b) power spectral density vs. frequency.

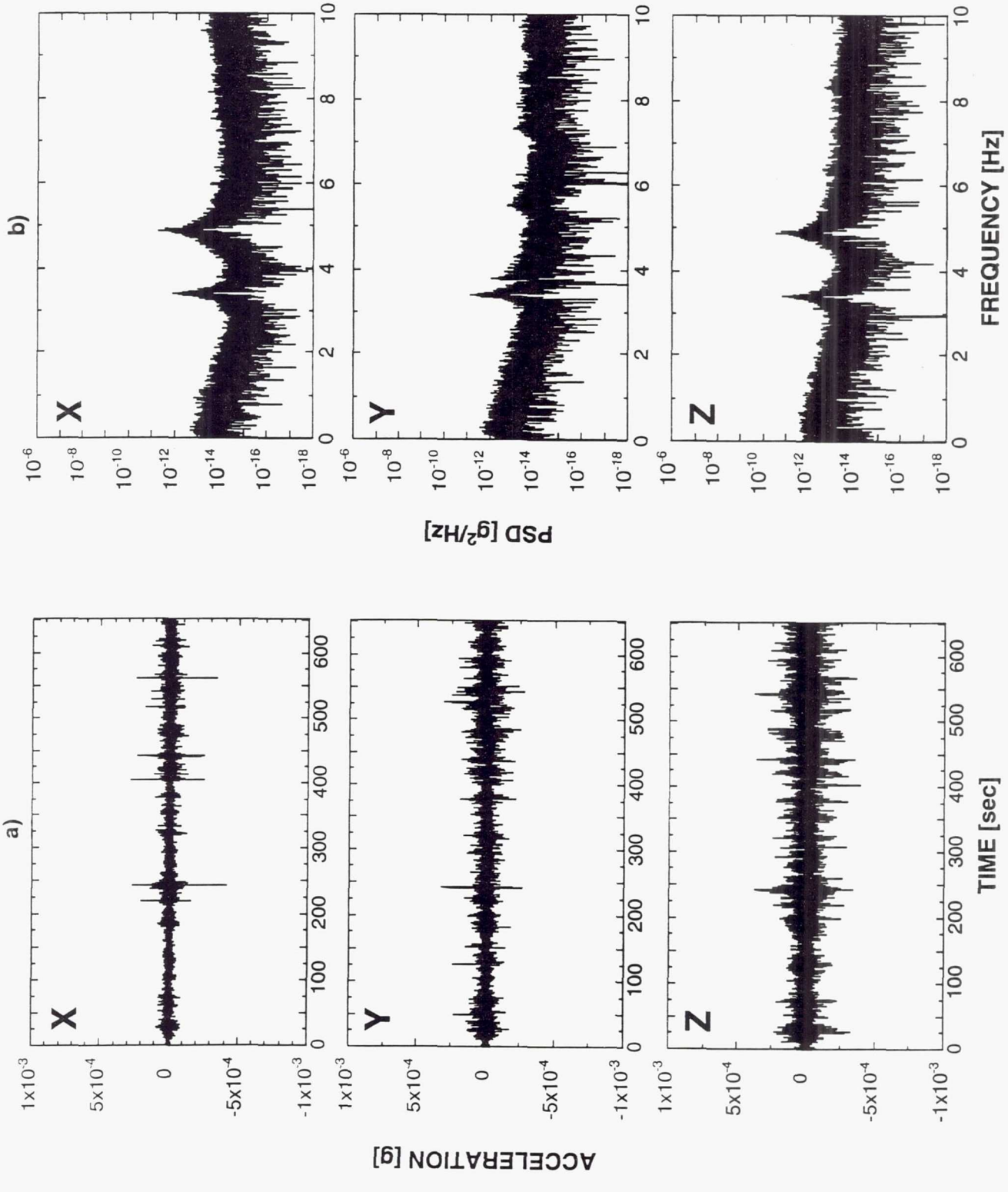

Fig. 4 SAMS Head A data starting at MET 009/06:18:59.993, STS-66, one shift asleep, one shift performing nominal activities. Column a) acceleration vs. time, column b) power spectral density vs. frequency.

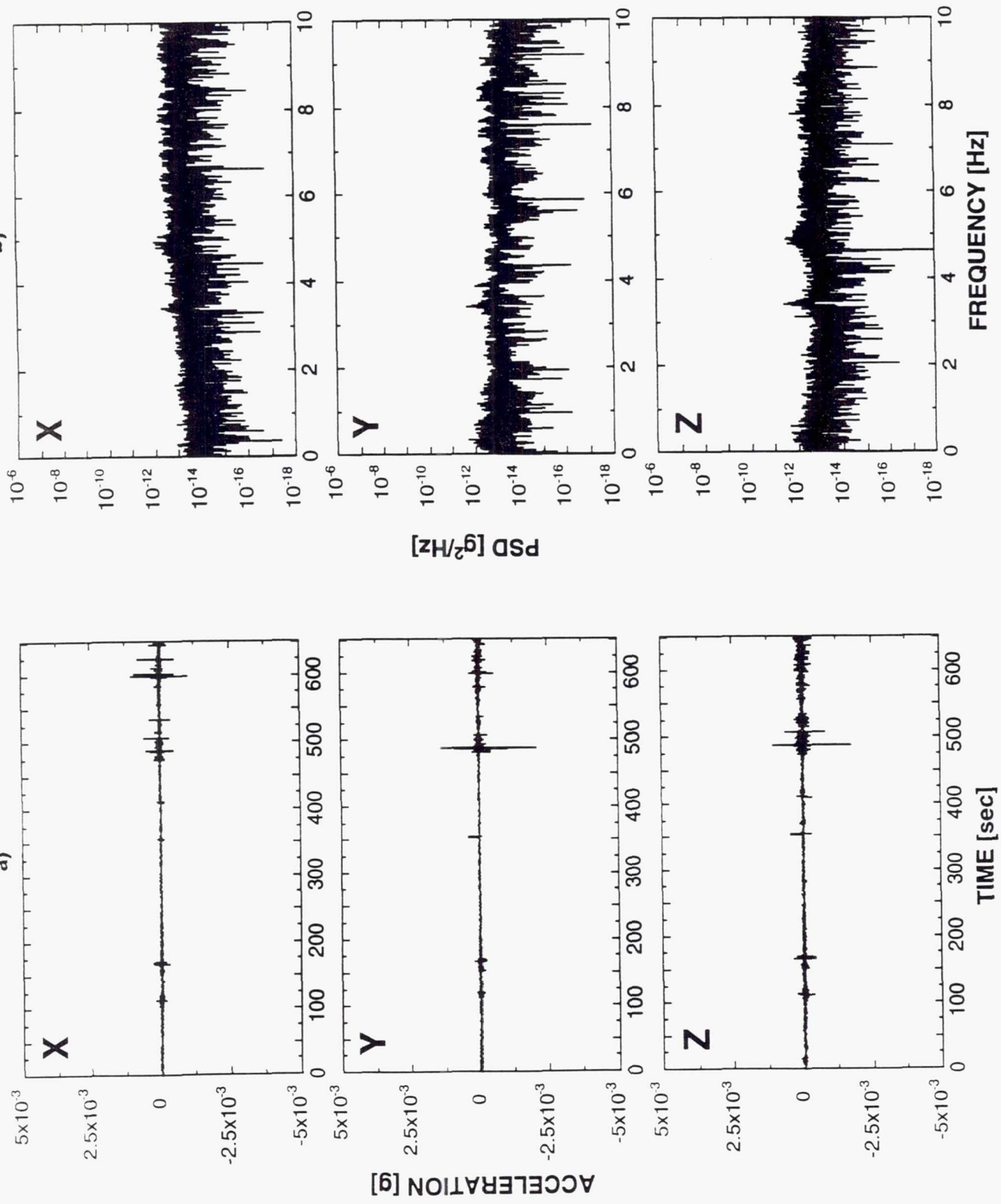

Fig. 5 SAMS Head A data starting at MET 004/20:19:02.319, STS-66, entire crew in Flight Deck, crew member touching SAMS Head A during public affairs conference. Column a) acceleration vs. time, column b) power spectral density vs. frequency.

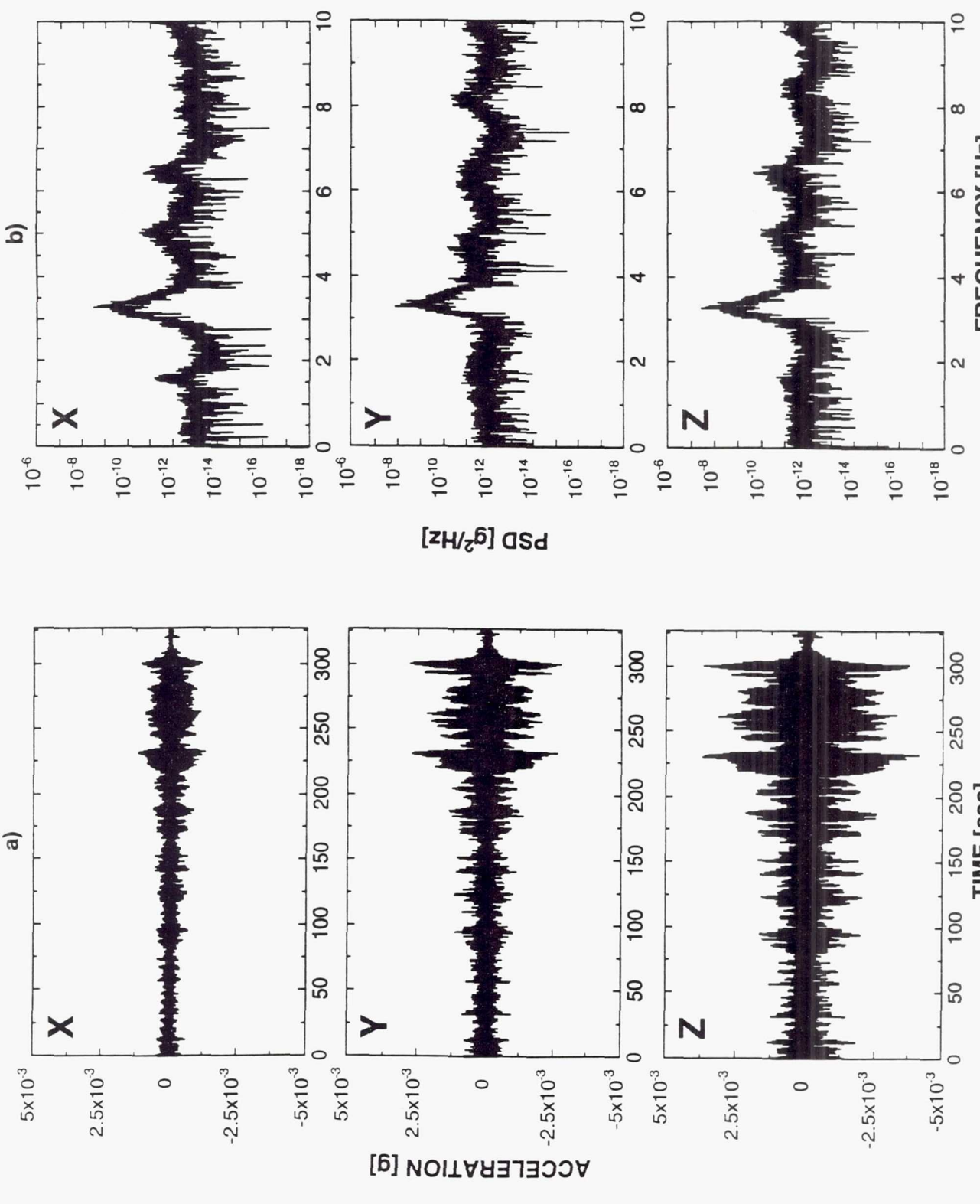

Fig. 6 SAMS Head A data starting at MET 003/20:17:59.988, STS-66, Pilot exercising on hard-mounted ergometer in Flight Deck. Column a) acceleration vs. time, column b) power spectral density vs. frequency.

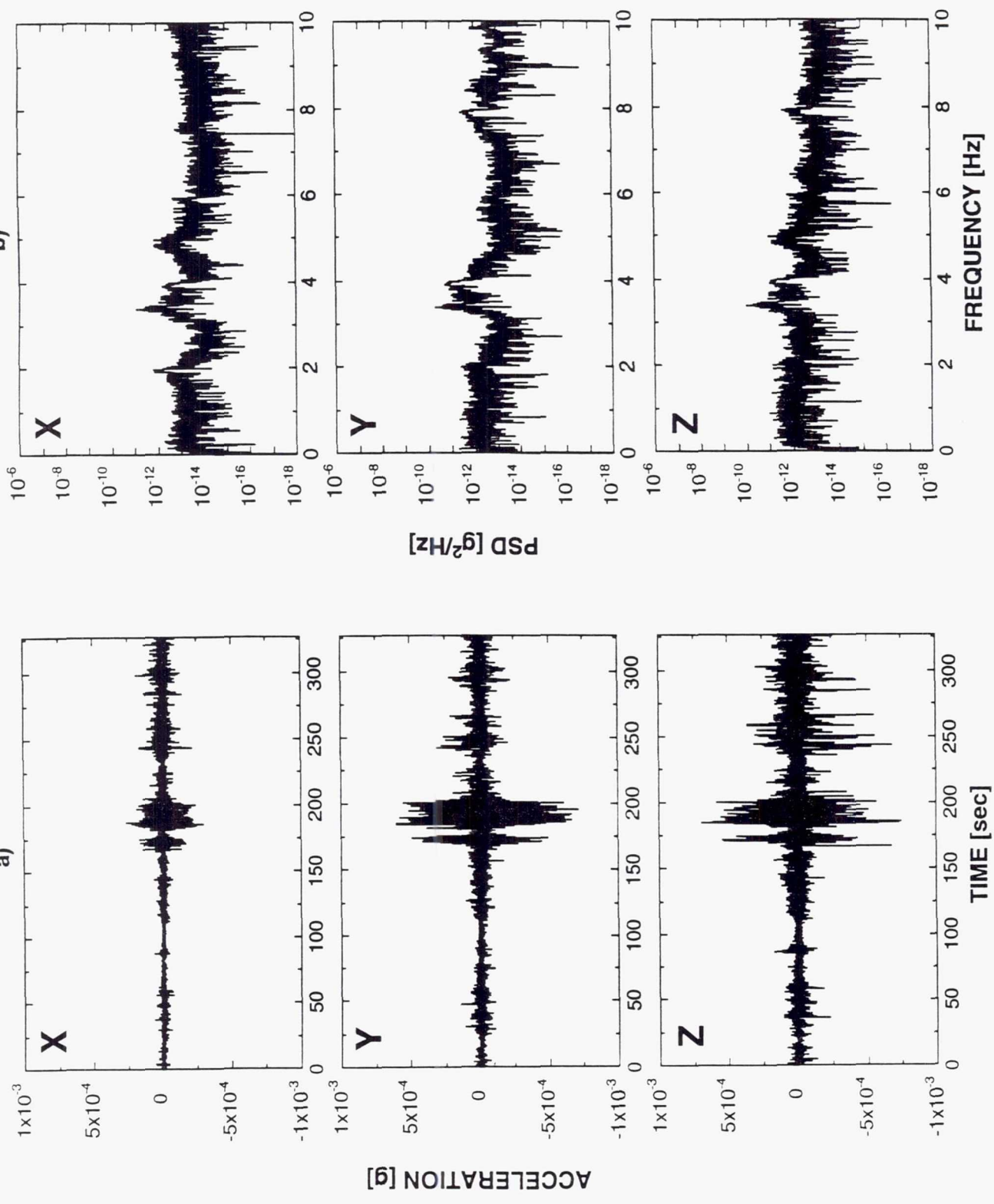

Fig. 7 SAMS Head A data starting at MET 009/05:27:59.992, STS-66, crew member exercising using ILRD in middeck. Column a) acceleration vs. time, column b) power spectral density vs. frequency.

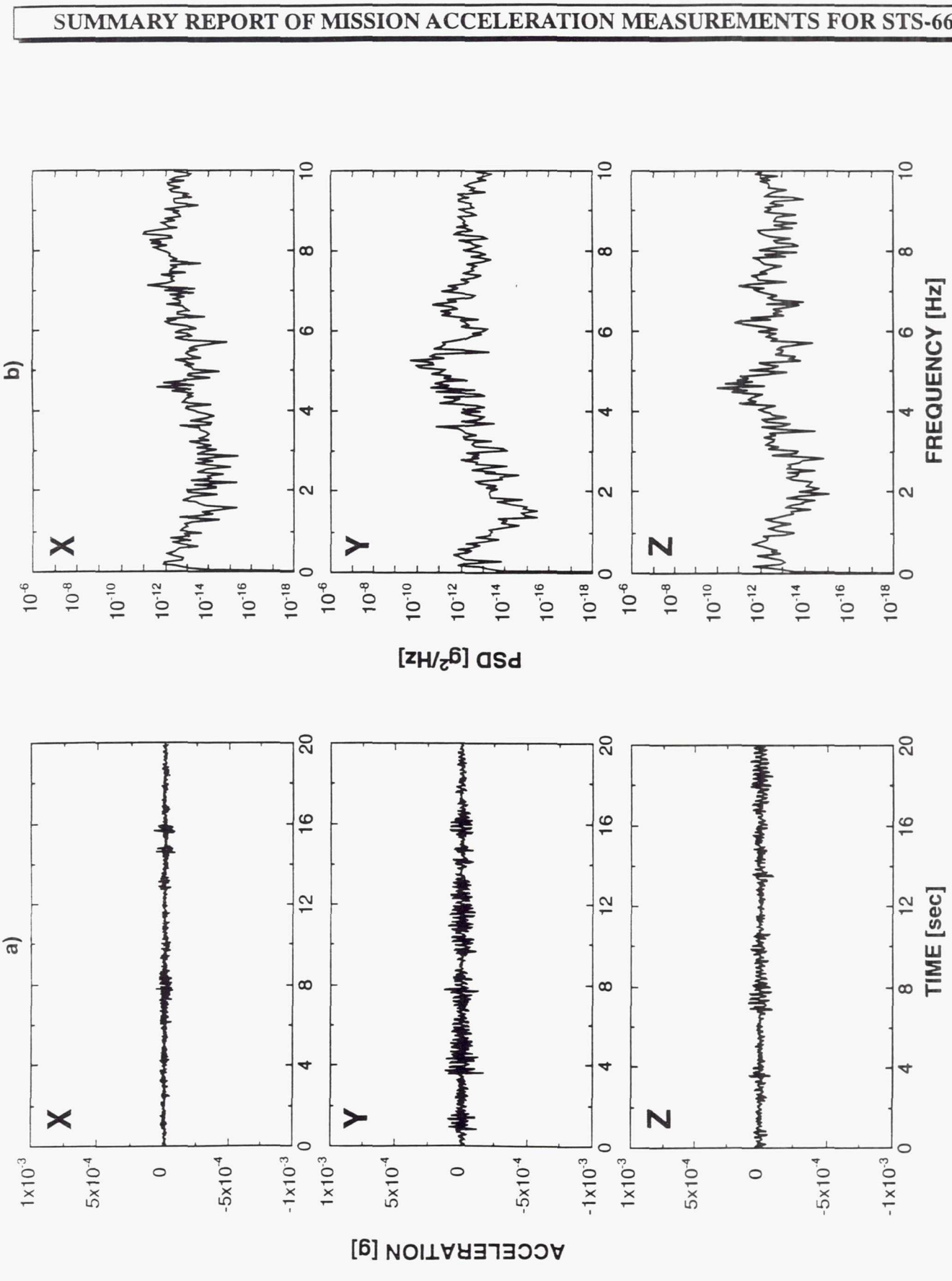

Fig. 8 SAMS Head A data starting at MET 009/04:30:00, STS-65, entire crew in flight deck. Column a) acceleration vs. time, column b) power spectral density vs. frequency.

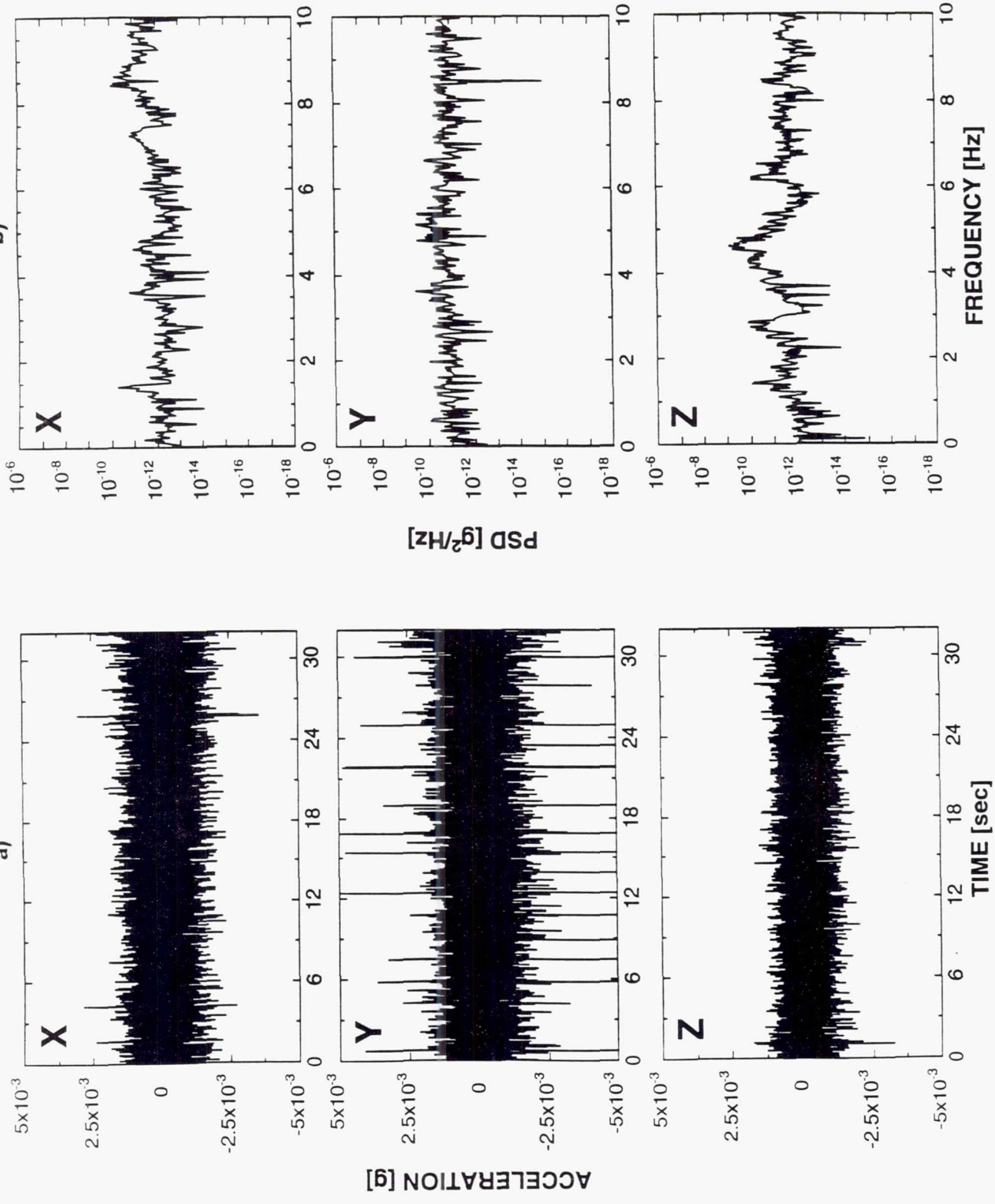

Fig. 9 SAMS Head C data starting at MET 001/07:34:42, STS-65, one shift asleep, one shift performing nominal activities. Column a) acceleration vs. time, column b) power spectral density vs. frequency.

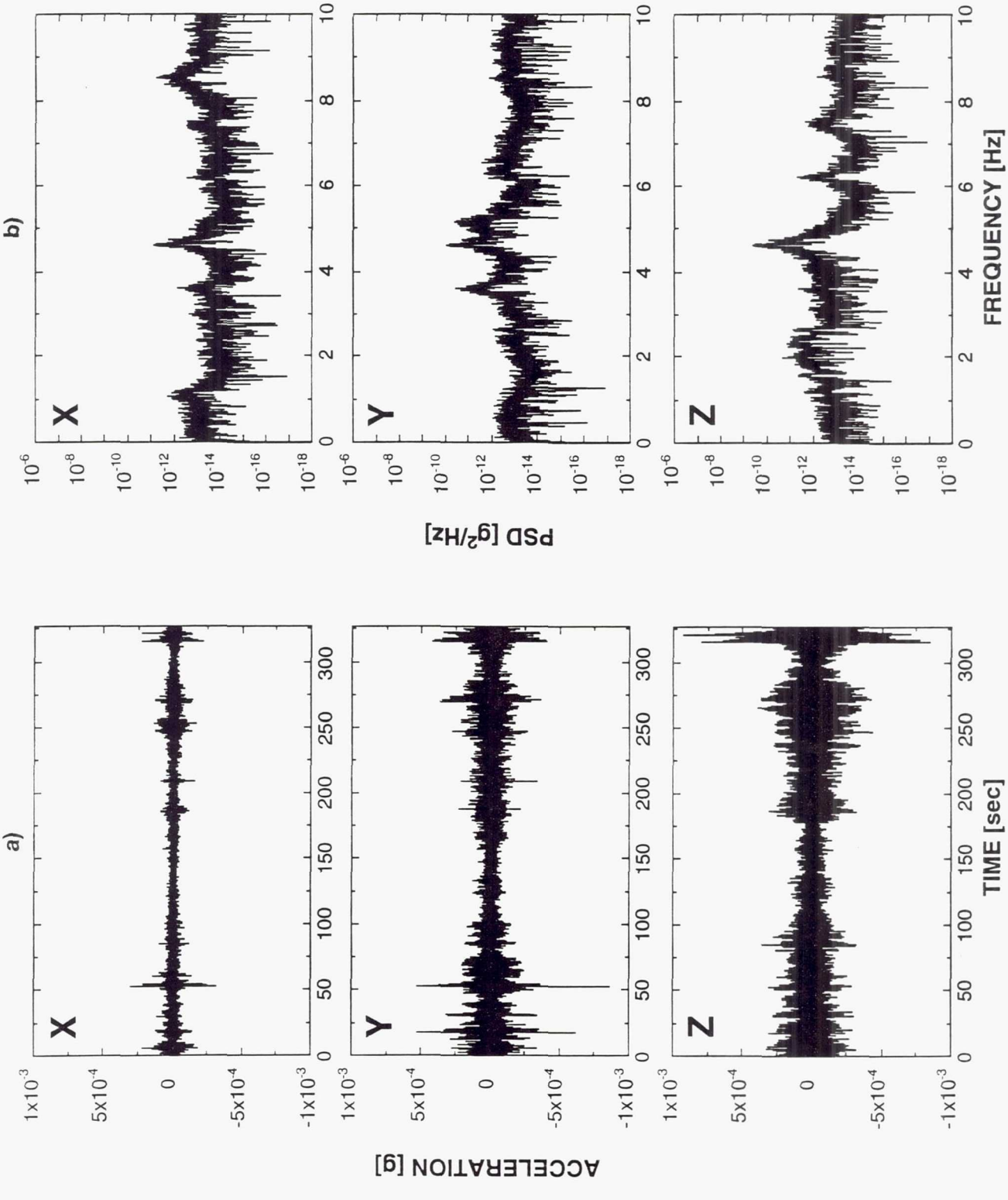

Fig. 10 SAMS Head A data starting at MET 001/07:07:14.988, STS-65, crew member exercising on isolated ergometer in the *middeck. Column a) acceleration vs. time, column b) power spectral density vs. frequency.*

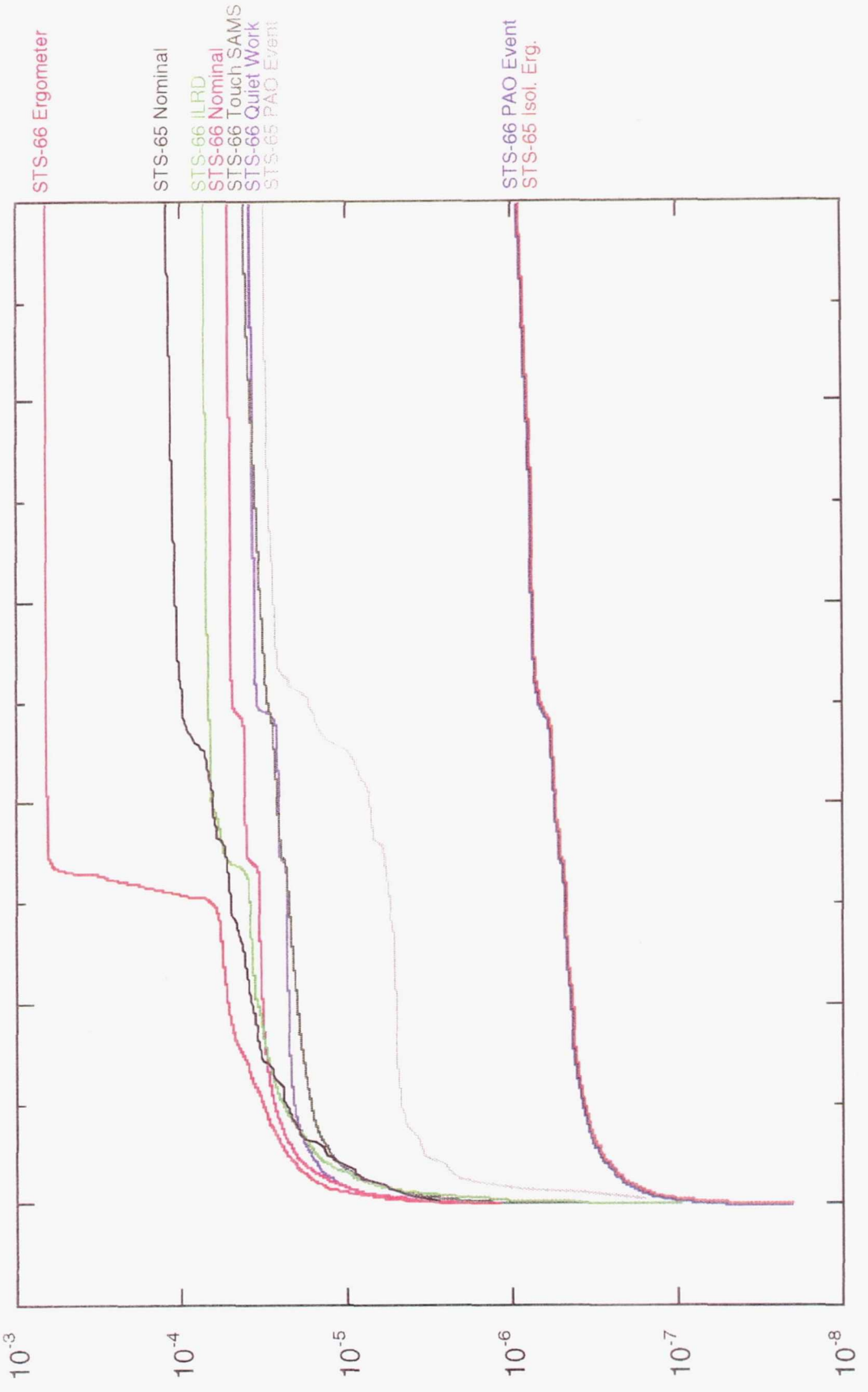

Fig. 11 Cumulative RMS acceleration vs. frequency for STS-66 and STS-65 events displayed in Figs. 4-12.

APPENDIX A ACCESSING SAMS DATA VIA INTERNET

SAMS data are distributed on CD-ROM media and are available on a computer file server. In both cases, files of SAMS data are organized in a tree-like structure as illustrated in the figure. Data acquired from a mission are categorized based upon sensor head, mission day, and type of data. Data files are stored at the lowest level in the tree and the file name reflects the contents of the file. For example, the file named axm00102.15r contains data for sensor head A, the X axis, the time base was Mission Elapsed Time, day 001, hour 02, 1 of 5 files for that hour, and it contains reduced data. The file readme.doc provides a comprehensive description and guide to the data.

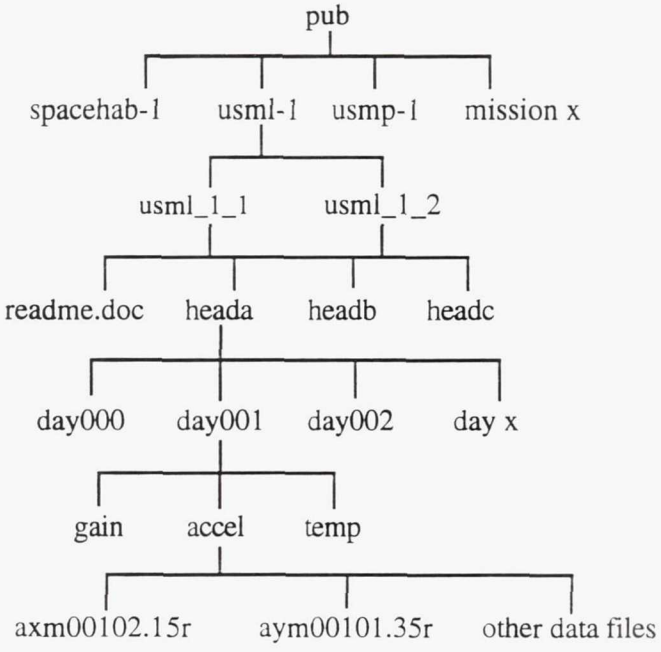

Figure A1 SAMS Data File Structure

Also available from the file server are some data access tools for different computer platforms.

SAMS data files may be accessed from a file server at NASA LeRC. The NASA LeRC file server beech.lerc.nasa.gov (tcp/ip address 139.88.19.43) can be accessed via anonymous file transfer protocol (ftp), as follows:

[1] Establish ftp connection to the beech file server.
[2] Login: anonymous
[3] Password: guest
[4] Change the directory to: pub

[5] List the files and directories in the pub directory.
[6] Change the directory to the mission of interest, for example: usml-1
[7] List files and directories for the specific mission chosen in previous step.
[8] Use the data file structure shown in the figure to find the files of interest.
[9] Transfer the data files of interest.

If you encounter difficulty in accessing the data using the file server, please send an electronic mail message to the internet address below. Please describe the nature of the difficulty and a description of the hardware and software you are using to access the file server.

pims@lerc.nasa.gov

APPENDIX B SAMS TIME HISTORIES

Accelerometer data collected on Orbiter missions are generally analyzed by the principal investigator or experiment team responsible for the system. The PIMS project at the NASA Lewis Research Center was formed in part to support microgravity PI's in the evaluation of acceleration effects on their experiments and to characterize the vibrational environment of the microgravity carriers and vehicles. The primary continual source of accelerometer data from mission to mission is SAMS. Some of the SAMS data from STS-66 are presented in Appendices B and C to provide PI's with an overview of the environment during the mission.

The raw data recorded by SAMS is processed to compensate for temperature and gain related errors of bias, scale factor, and axis misalignment. The processing utilizes a fourth order temperature model to compensate the data and convert the raw digitized data into engineering units (Thomas, et al., 1992). The data are transformed to the shuttle structural coordinate system and formatted into files for distribution via CD-ROM and file server. See Appendix A for information on file server access to SAMS data.

The compensated data are further processed to produce the plots shown here. Two time history representations of the data are provided: ten second average and ten second root mean square (rms) plots. These calculations are presented in two hour plots with the corresponding average and rms plots on one page. The ten second average plots should be used to identify times when the steady level of the acceleration signal deviates from the background level. The ten second rms plots should be used to identify times when oscillatory and/or transient deviations from the background acceleration levels occurred.

Average and Root Mean Square Calculations

The average plots were produced using STS-66 SAMS, Head A data. Head A data were collected at 50 samples per second and a 10 Hz low pass filter was applied to the data by the SAMS unit prior to digitization. The plots were produced by calculating the average of ten second intervals of data for each axis and forming a vector magnitude with the resulting data streams. The rms plots were produced by taking the root-mean-square of ten second intervals of data for each axis and forming a vector magnitude with the resulting data stream.

References

Thomas, J. E., R. B. Peters, and B. D. Finley, Space Acceleration Measurement System triaxial head error budget. NASA Technical Memorandum 105300, January 1992.

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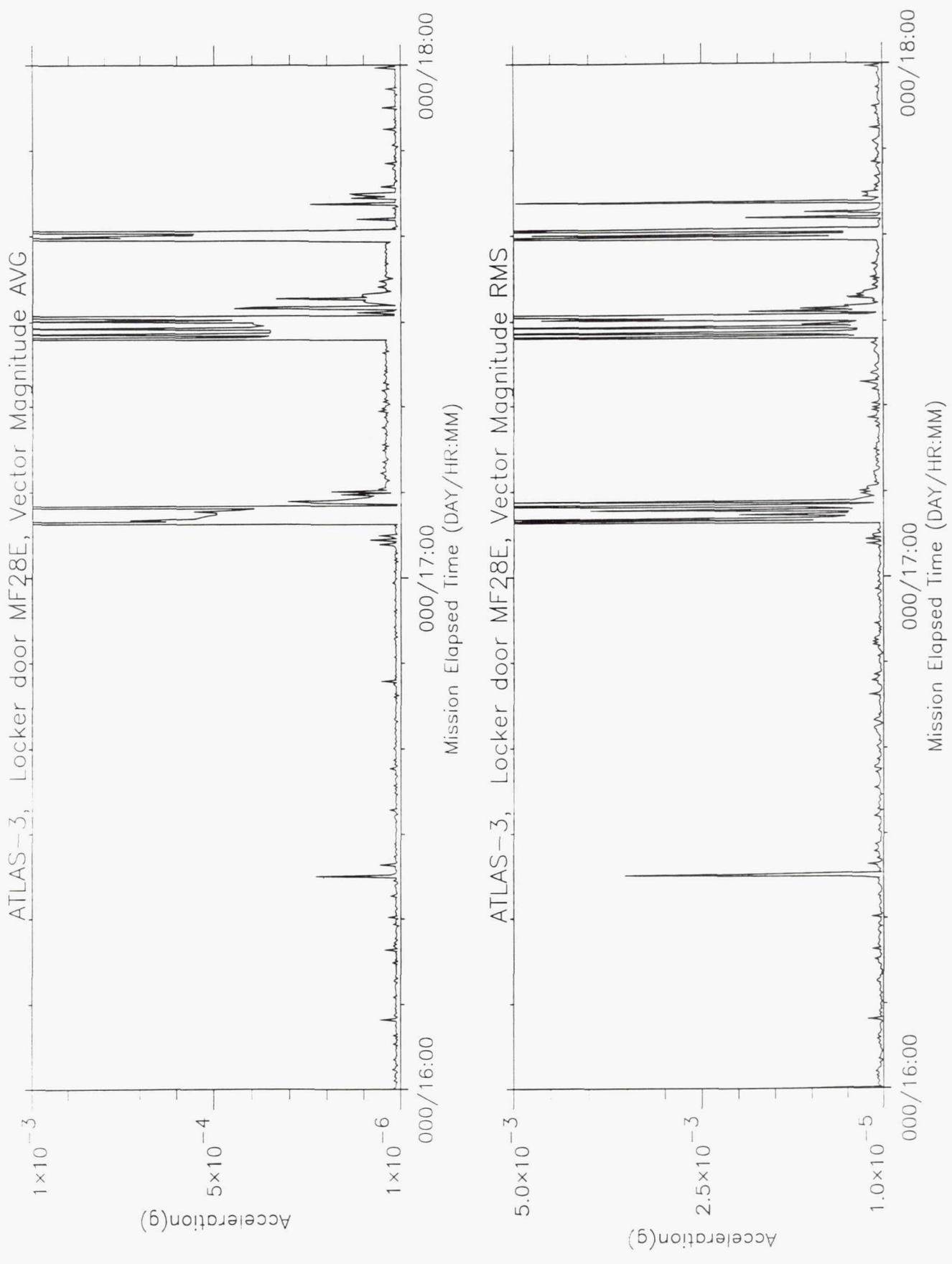
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5×10^-4
1×10^-6
000/16:00
000/17:00
000/18:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
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1.0×10^-5
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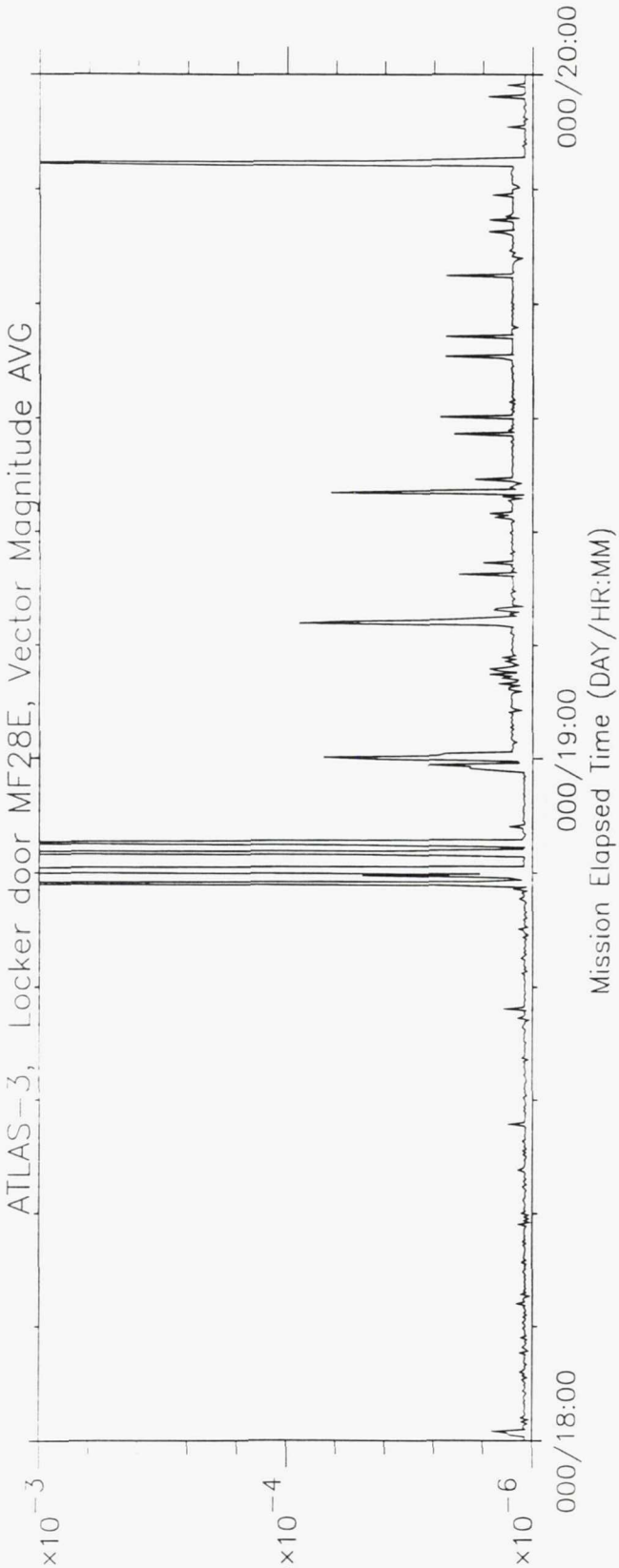
000/18:00
Mission Elapsed Time (DAY/HR:MM)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Acceleration(g)
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000/20:00
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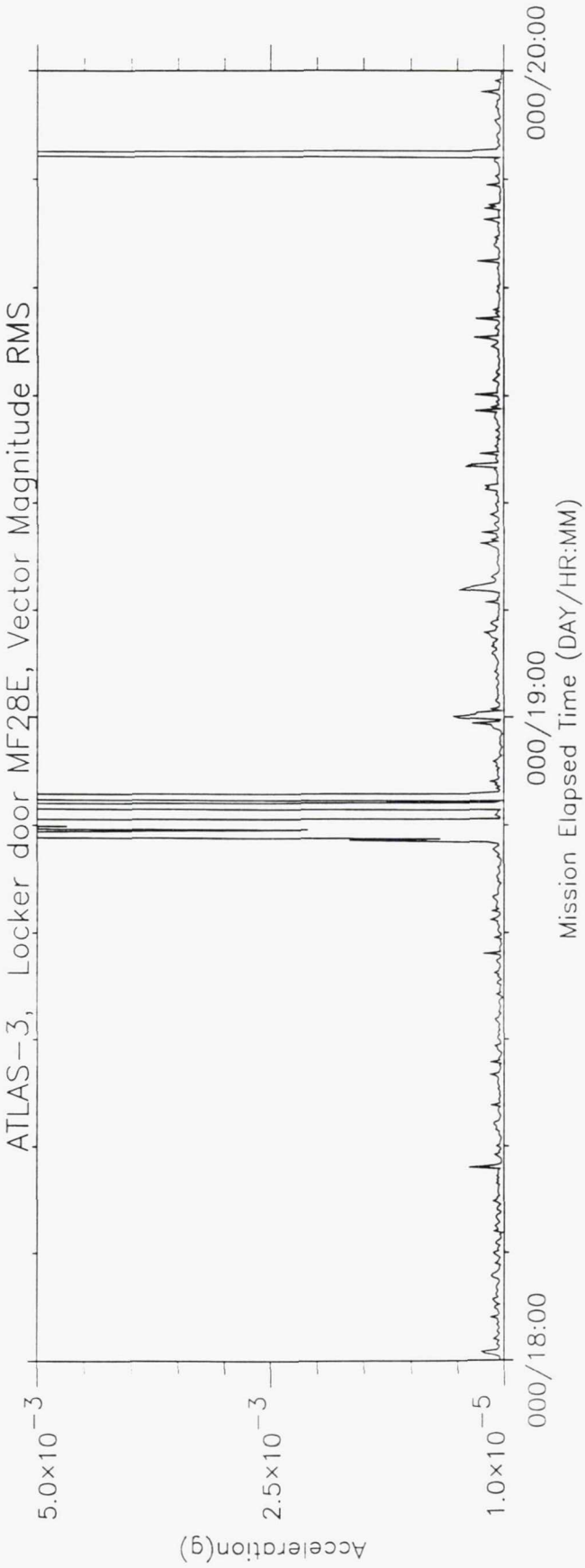
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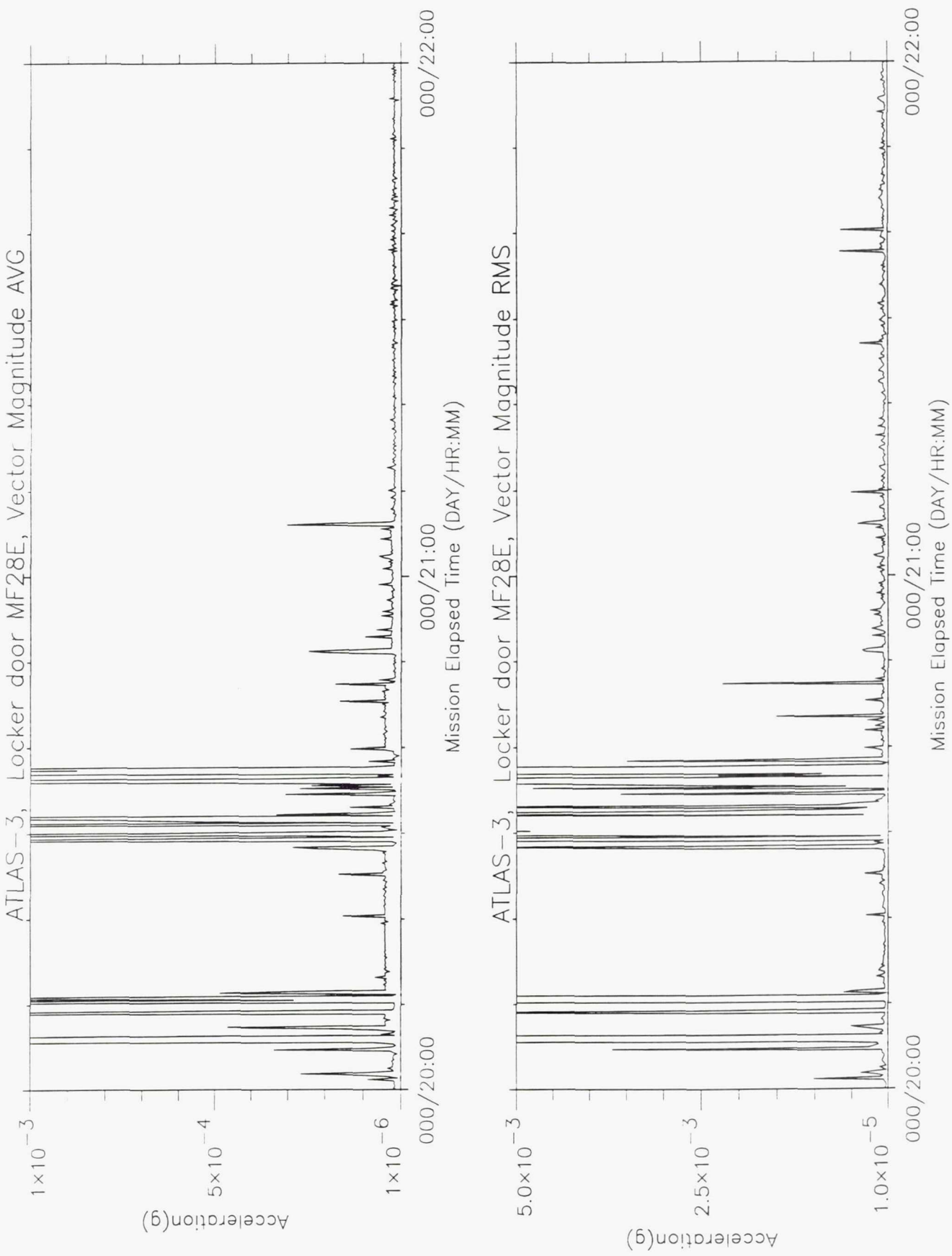
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Acceleration(g)
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000/21:00
000/22:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
2.5×10^-3
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Acceleration(g)
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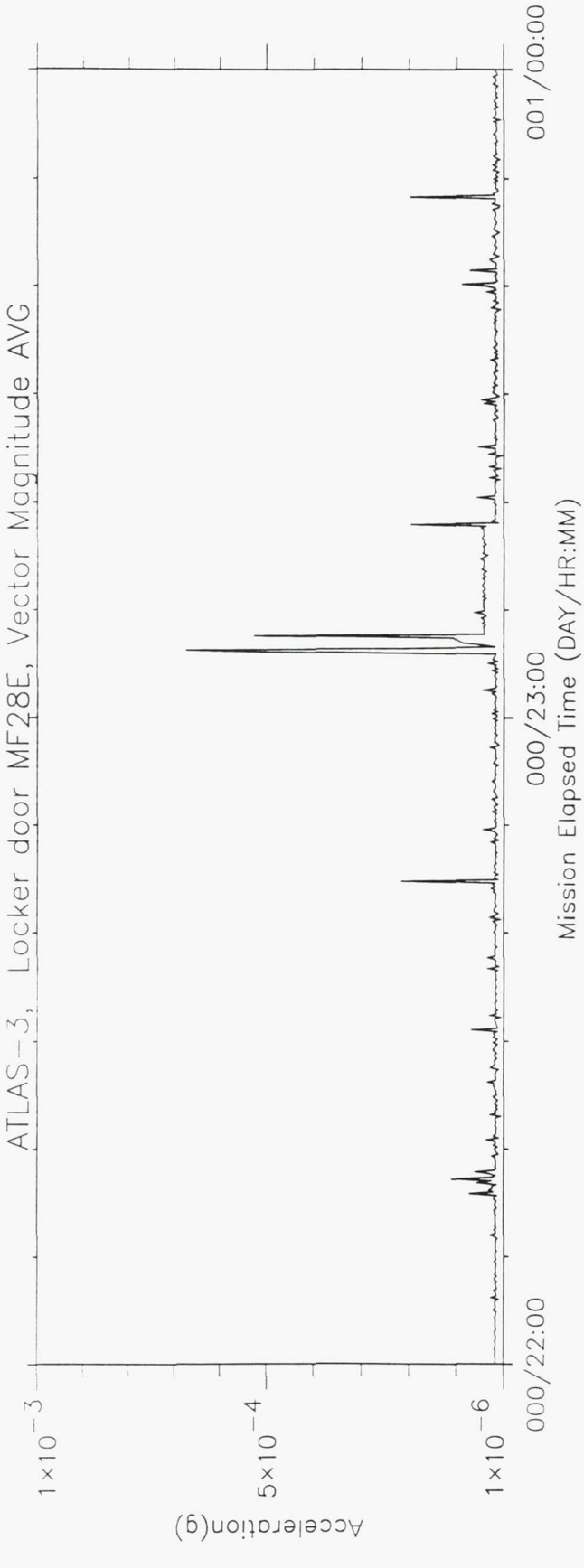
000/22:00
Mission Elapsed Time (DAY/HR:MM)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Acceleration(g)
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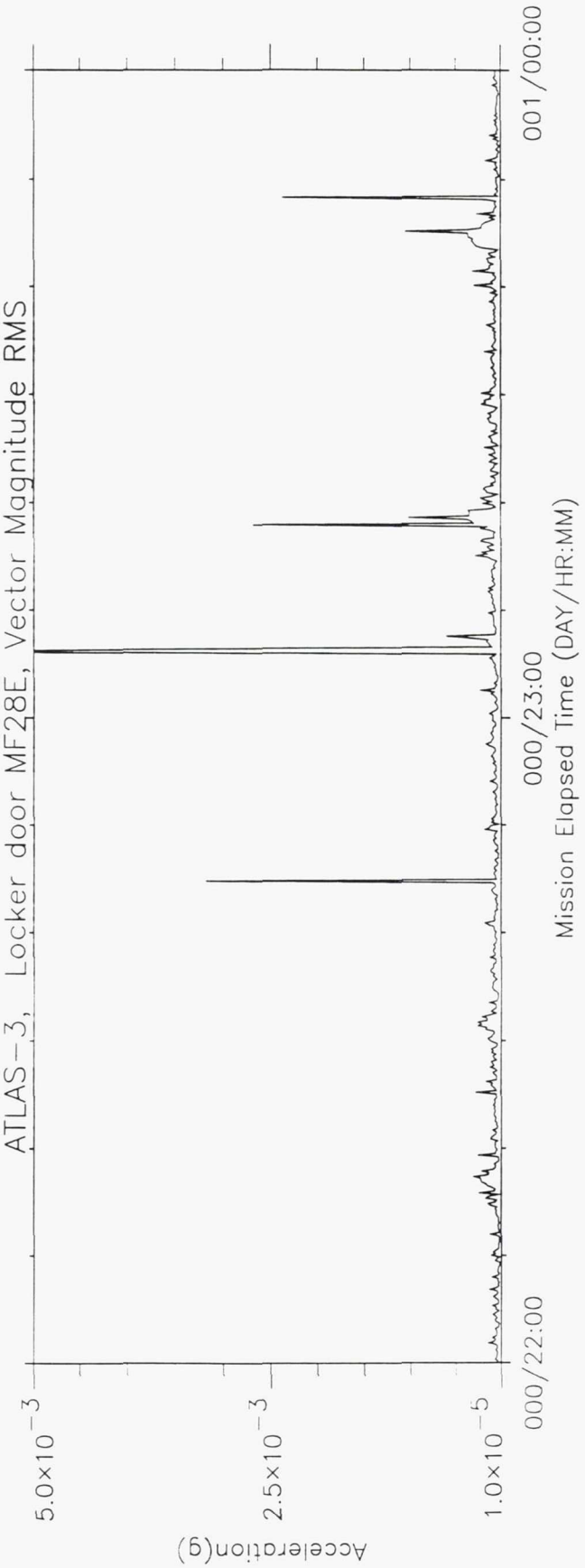
Mission Elapsed Time (DAY/HR:MM)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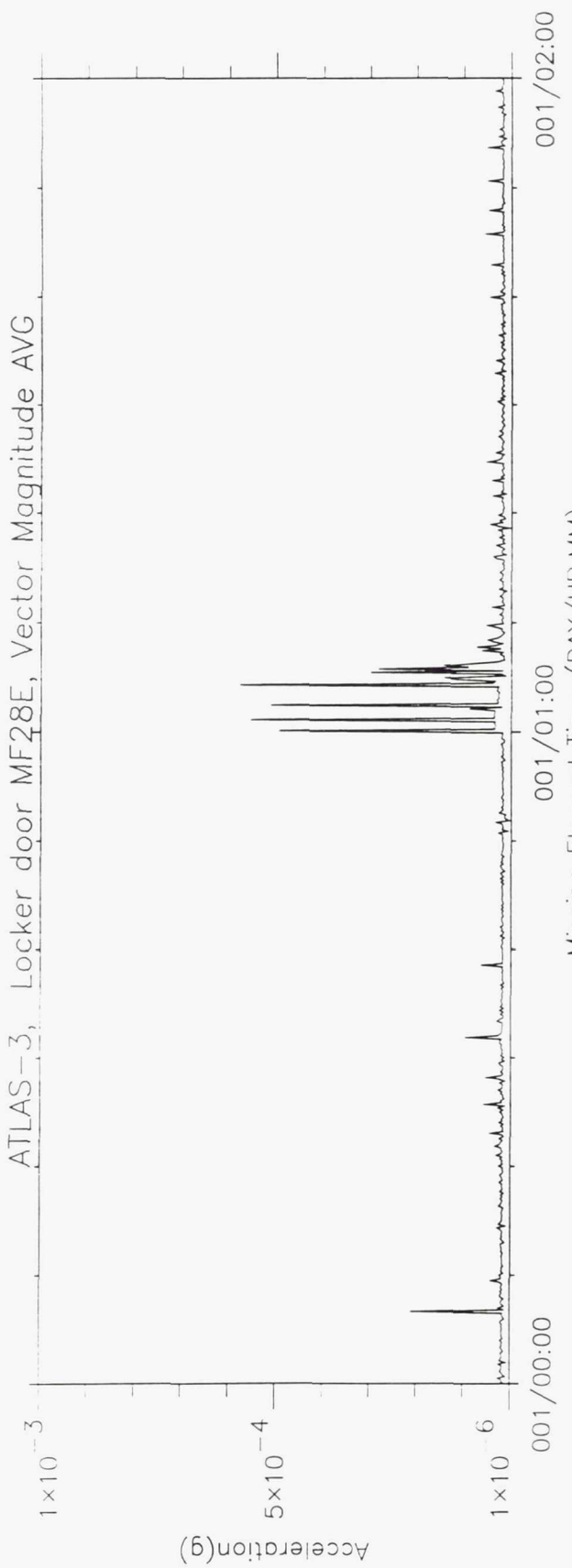
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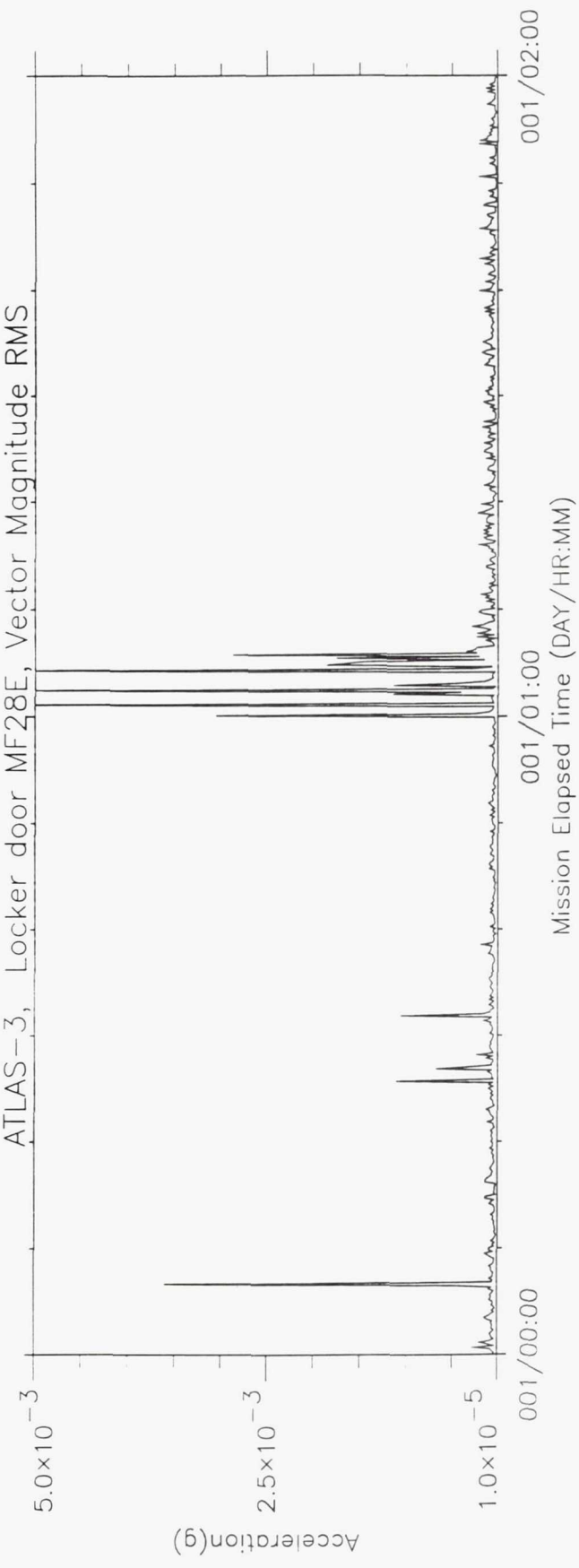
Mission Elapsed Time (DAY/HR:MM)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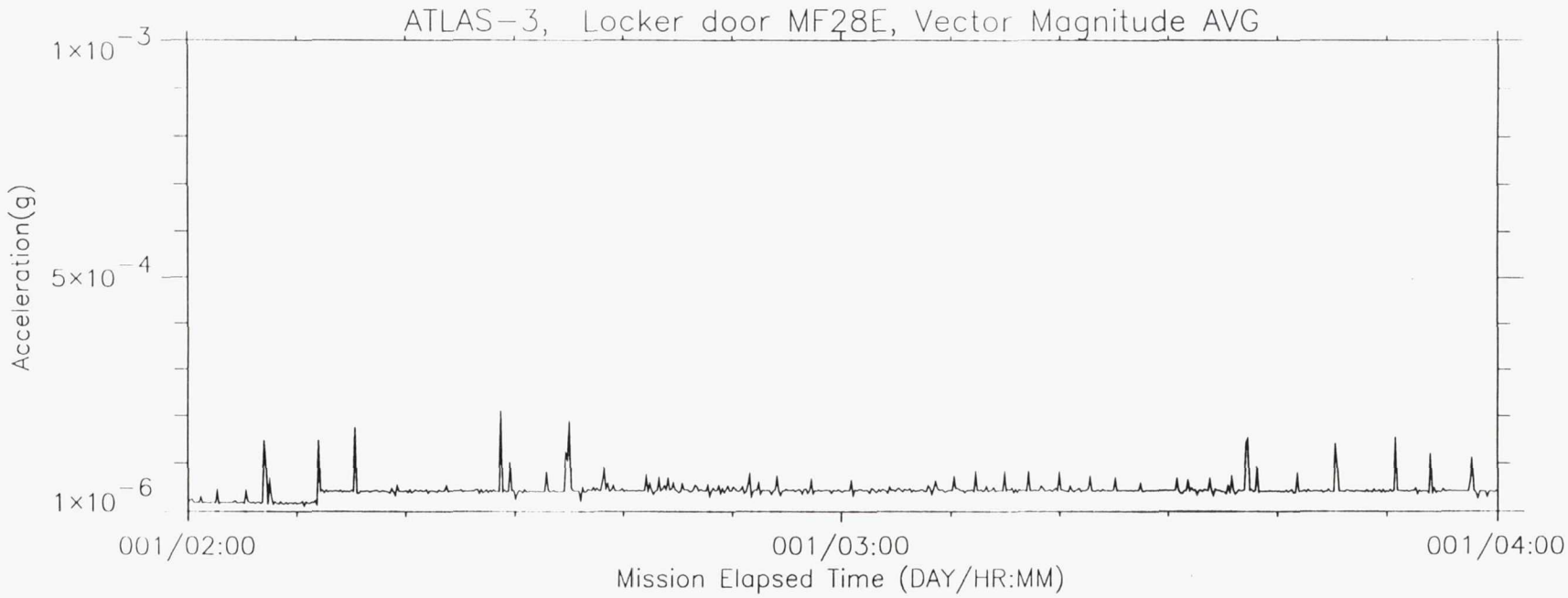
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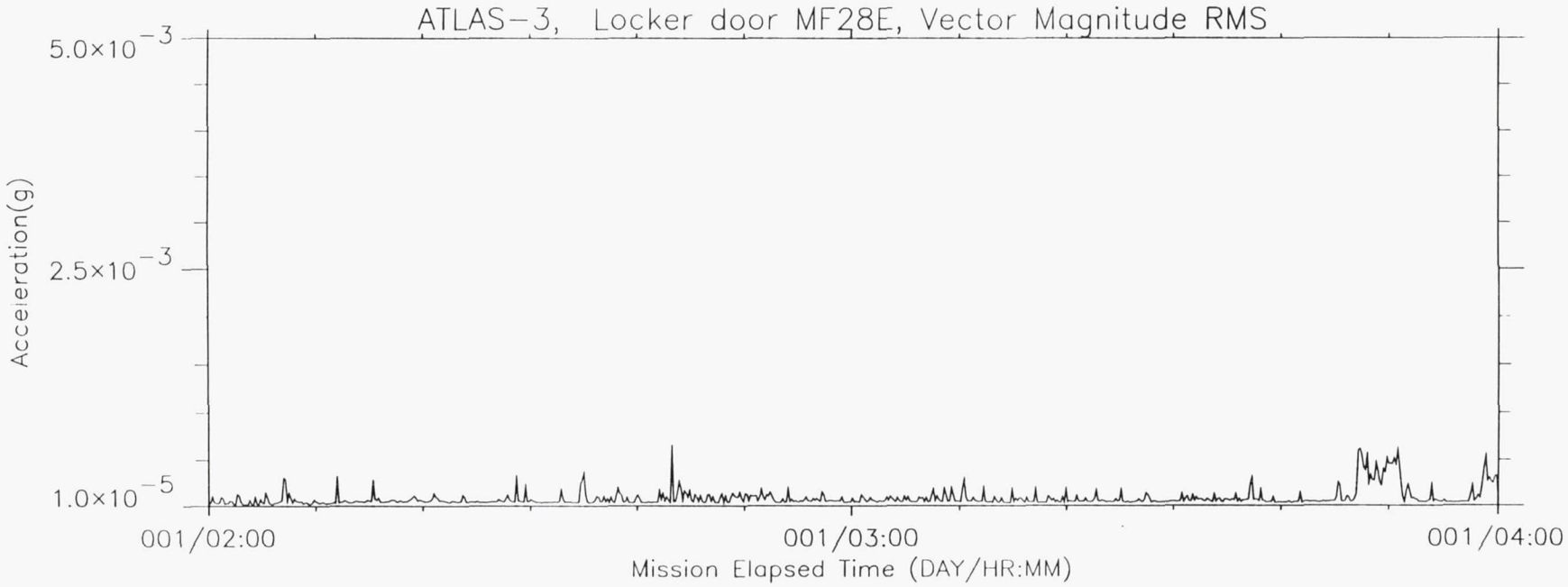
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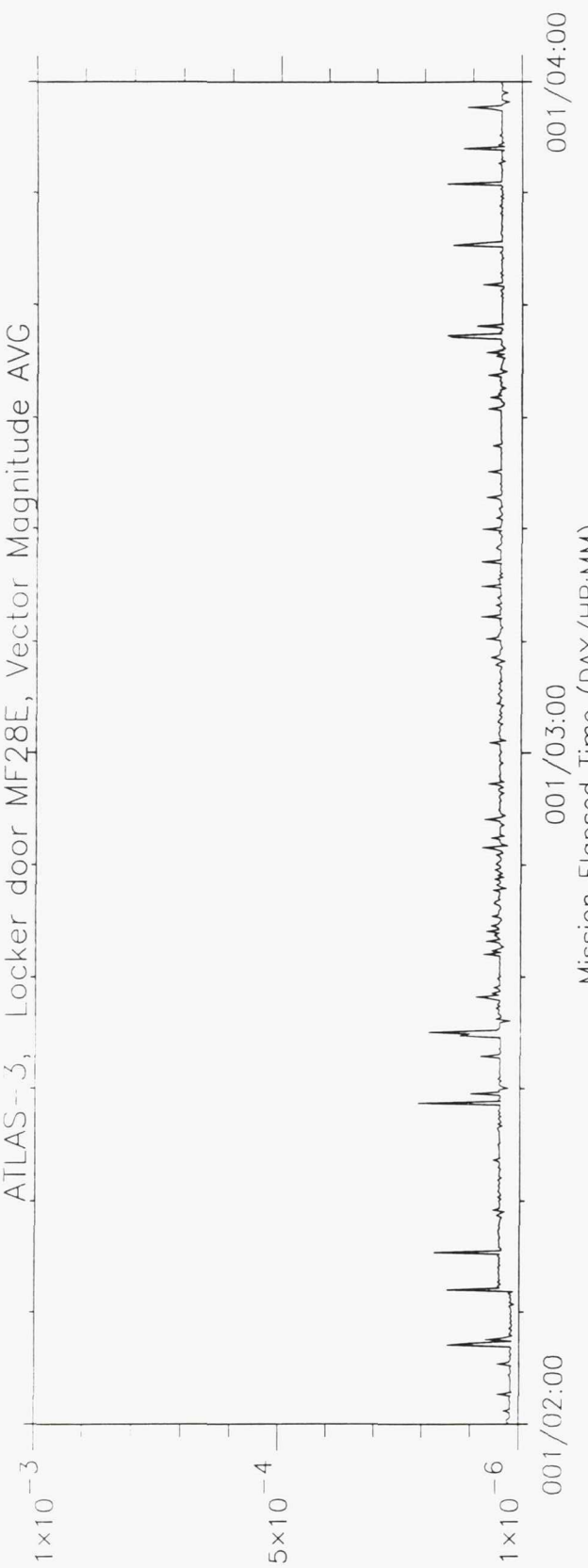
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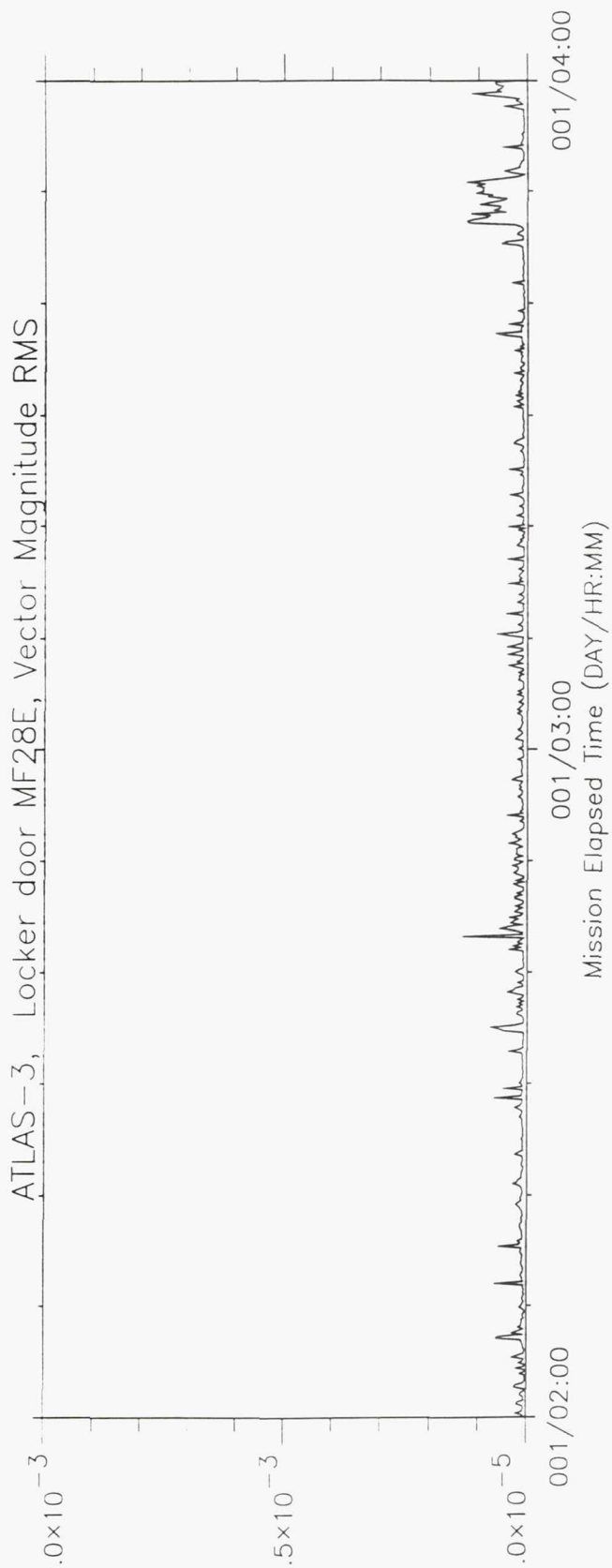
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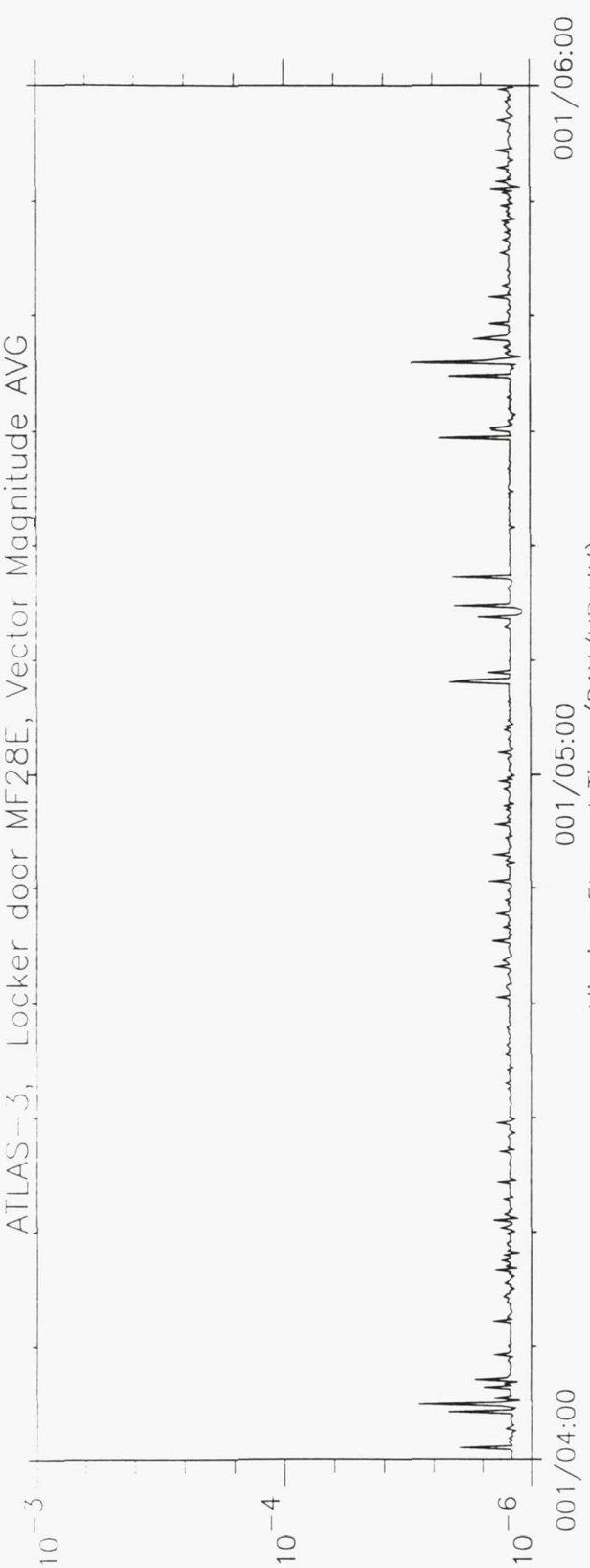
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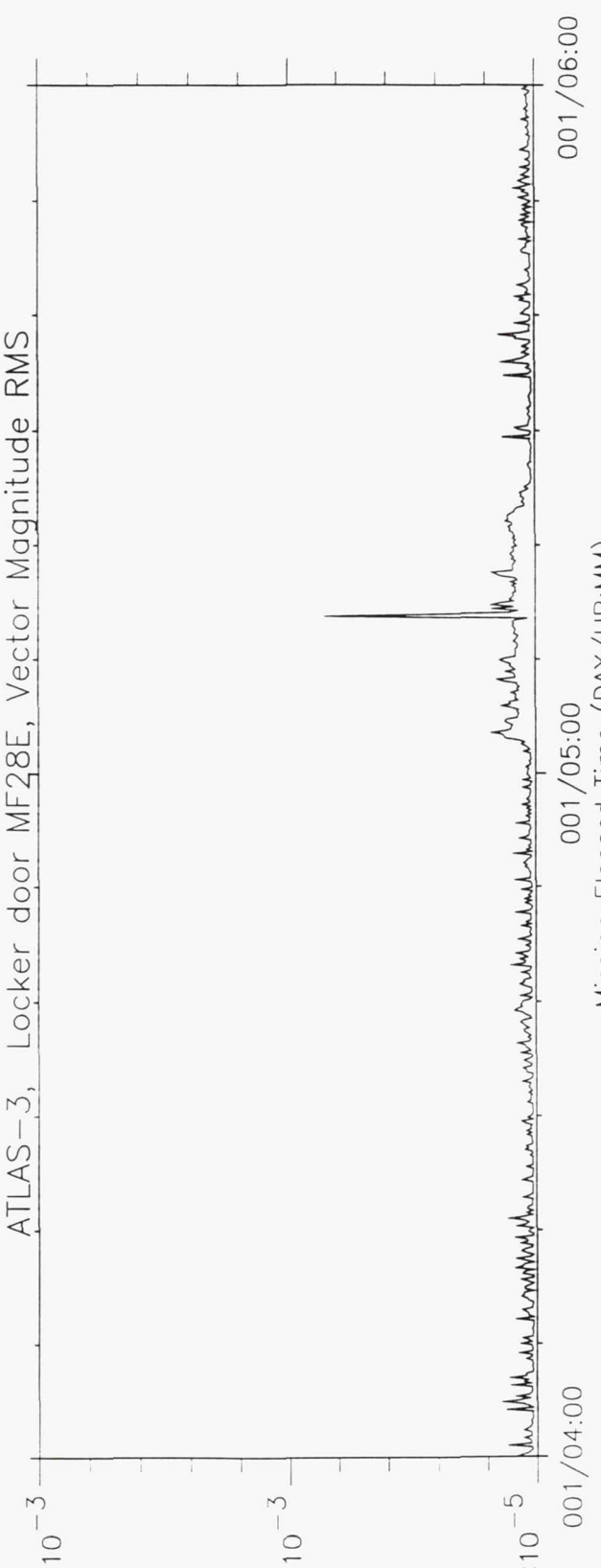
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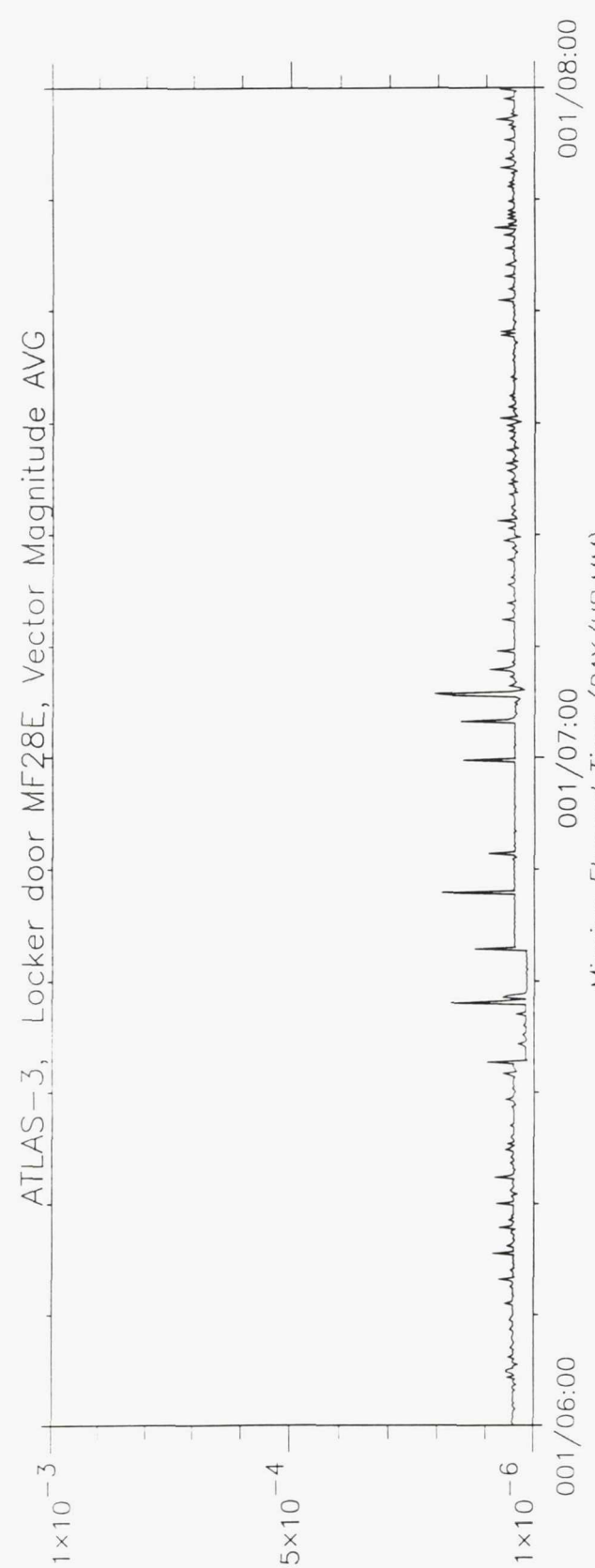
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Acceleration(g)
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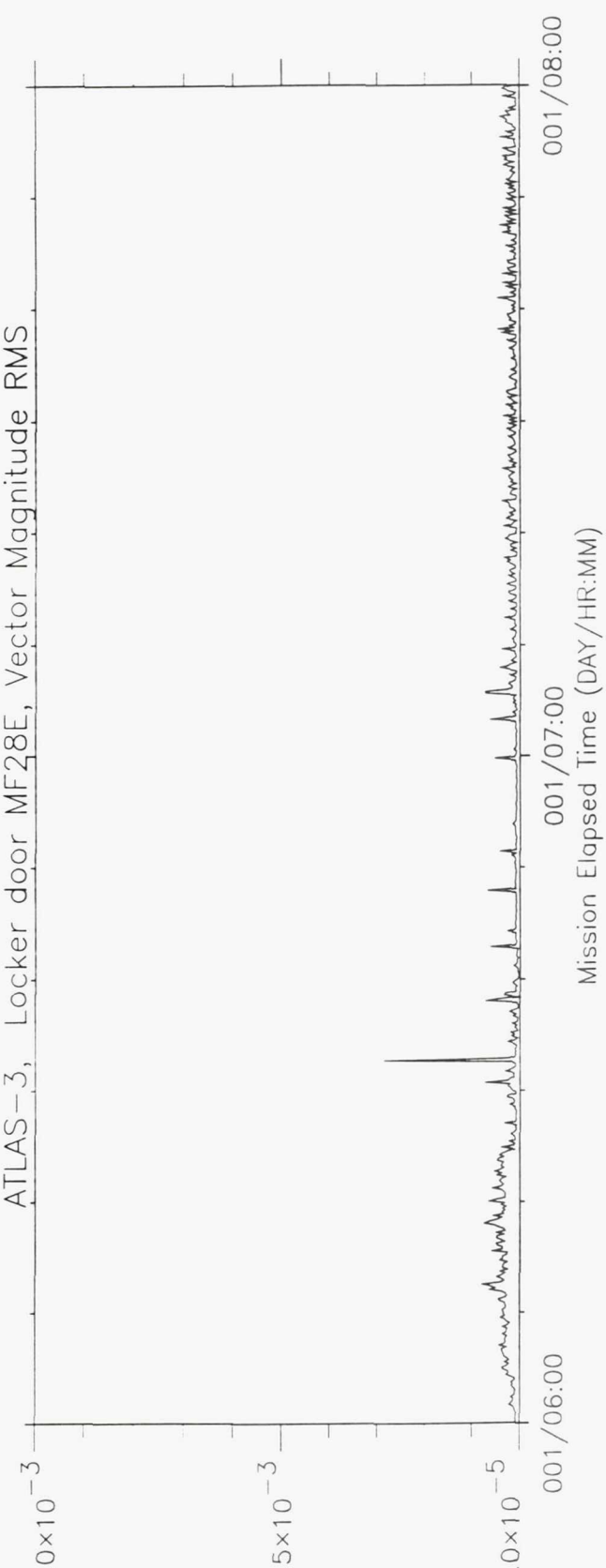
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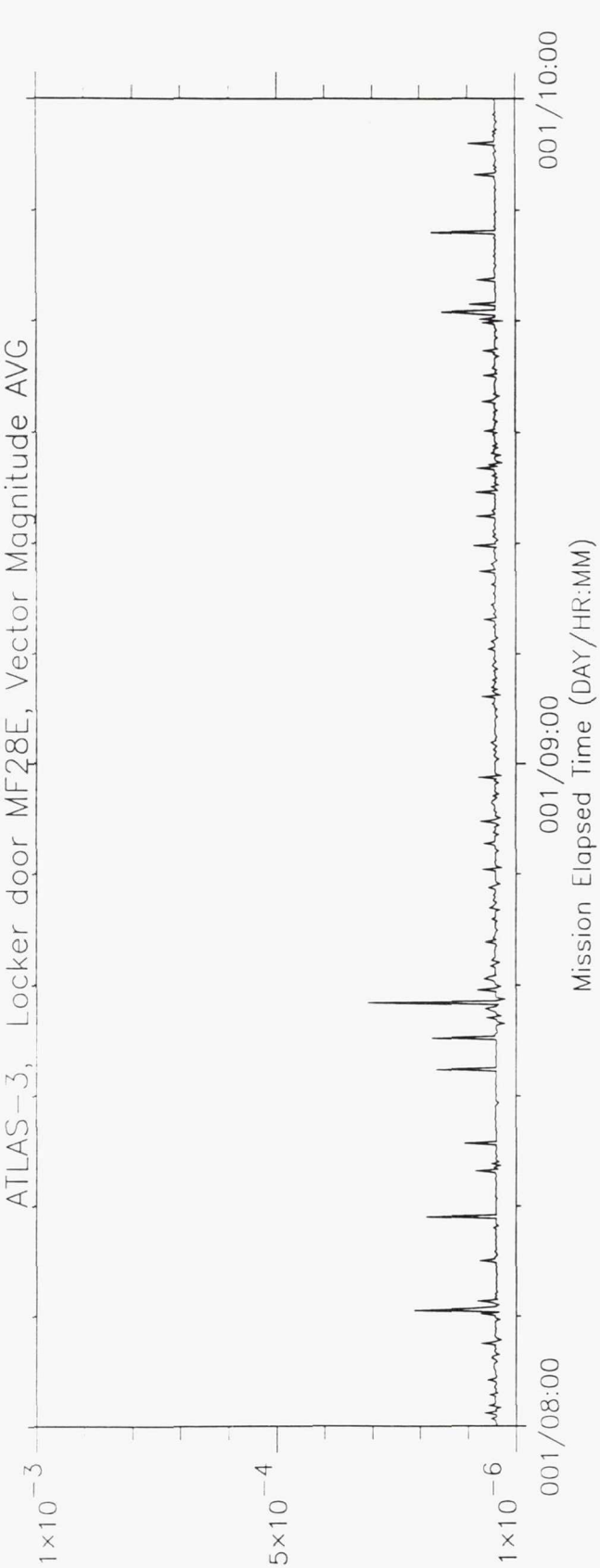
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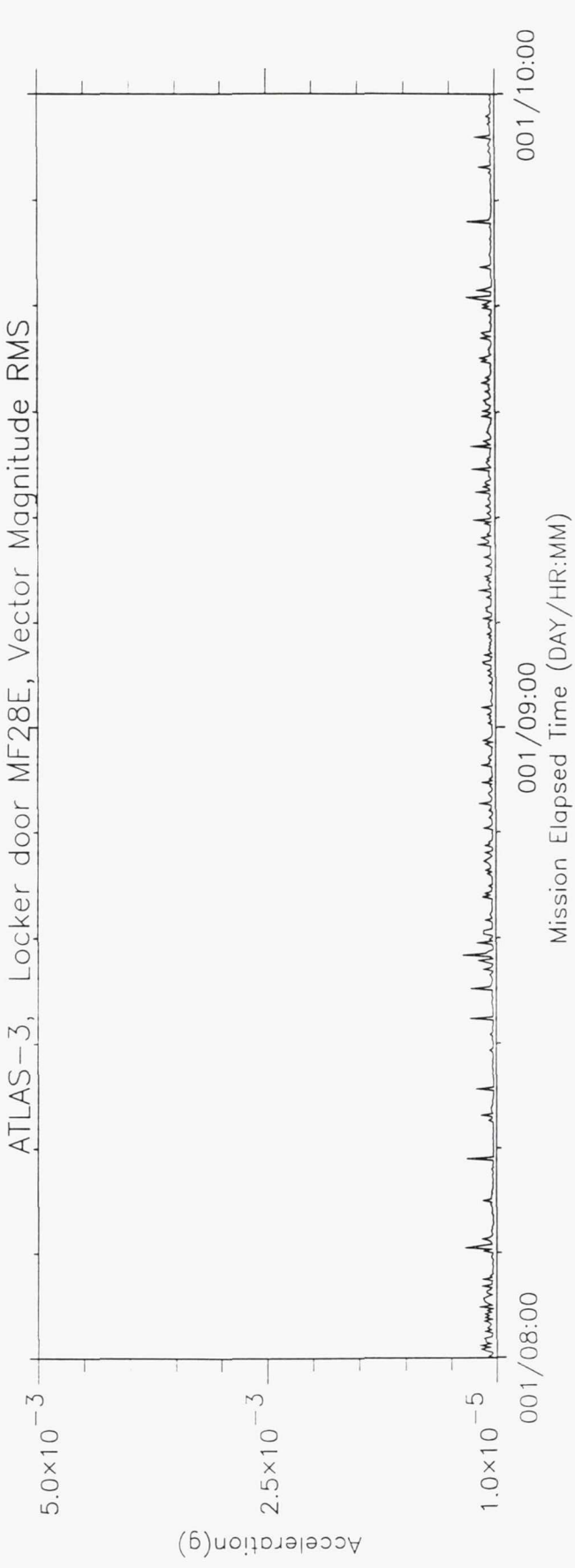
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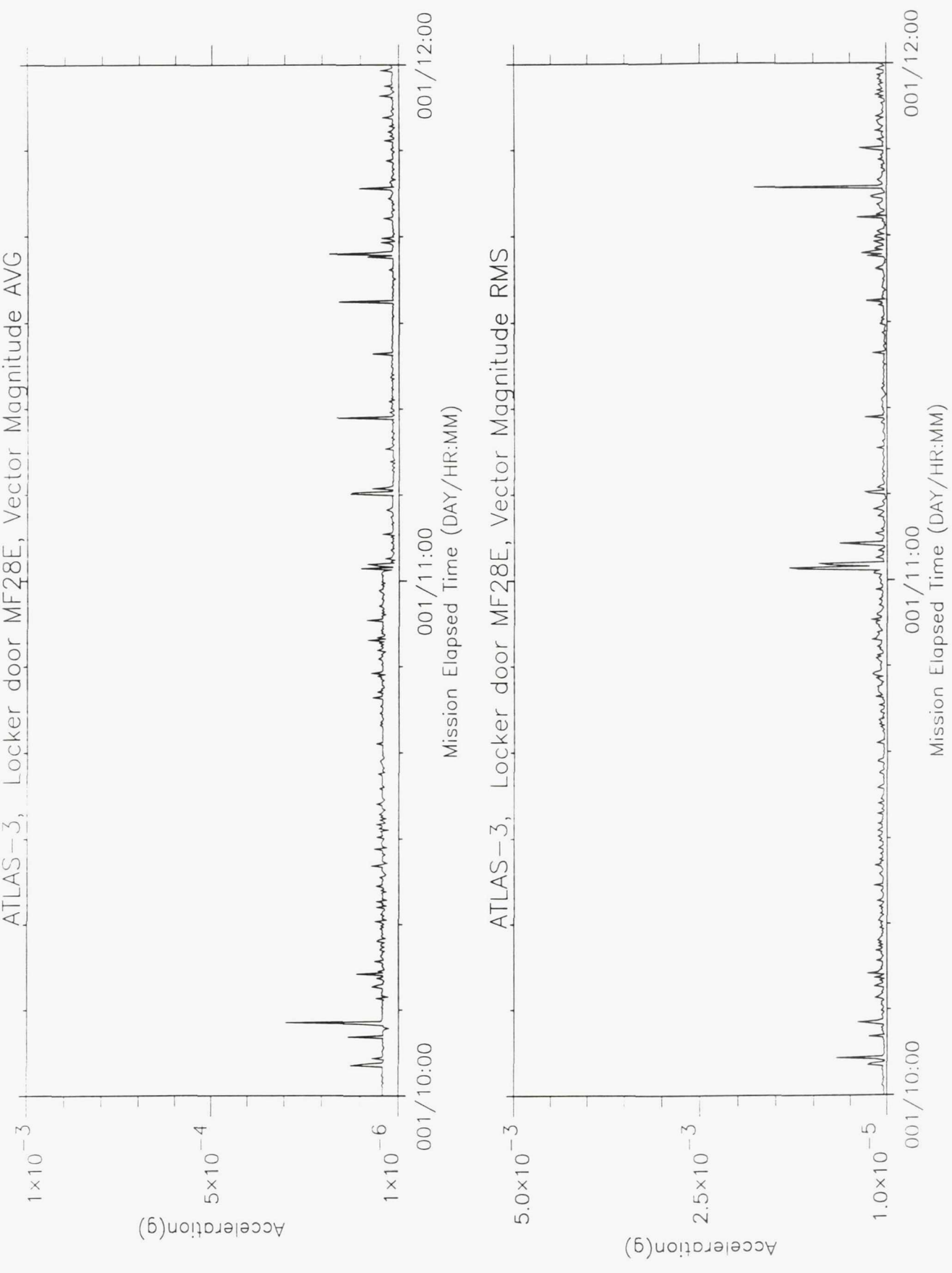
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Acceleration(g)
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Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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Acceleration(g)
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001/12:00
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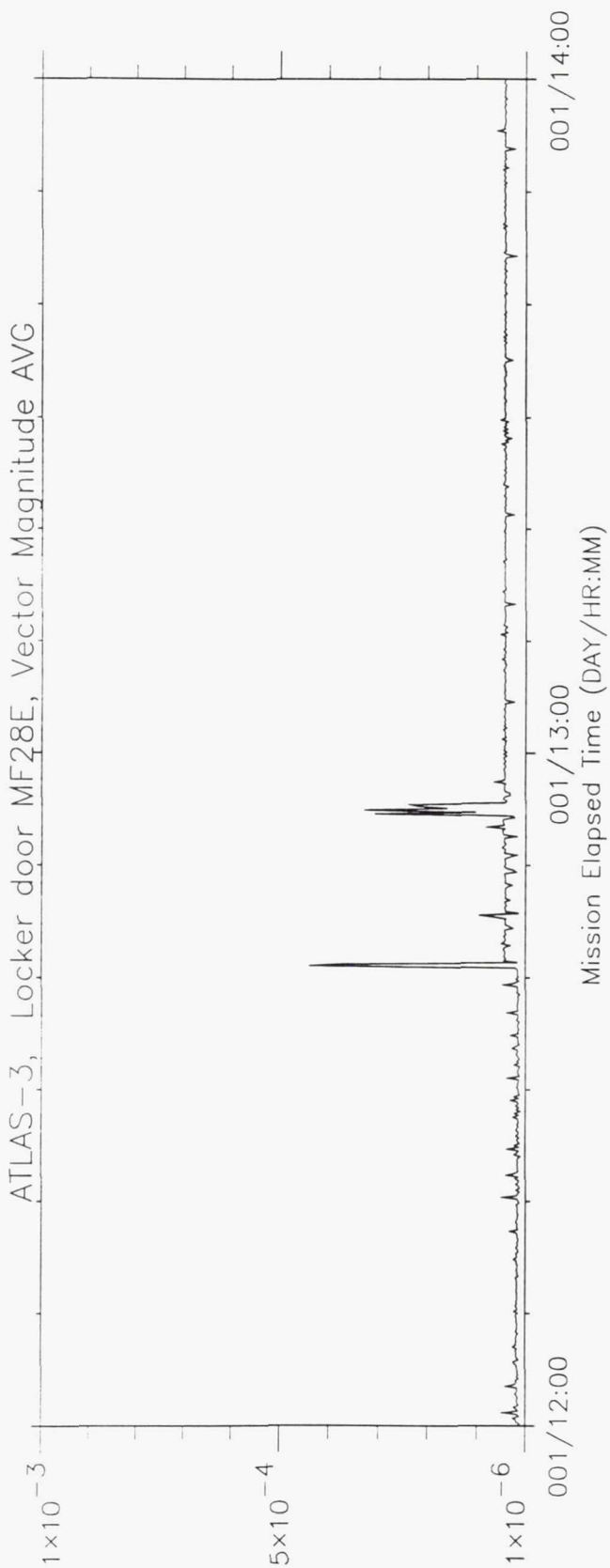
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Acceleration(g)
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001/14:00
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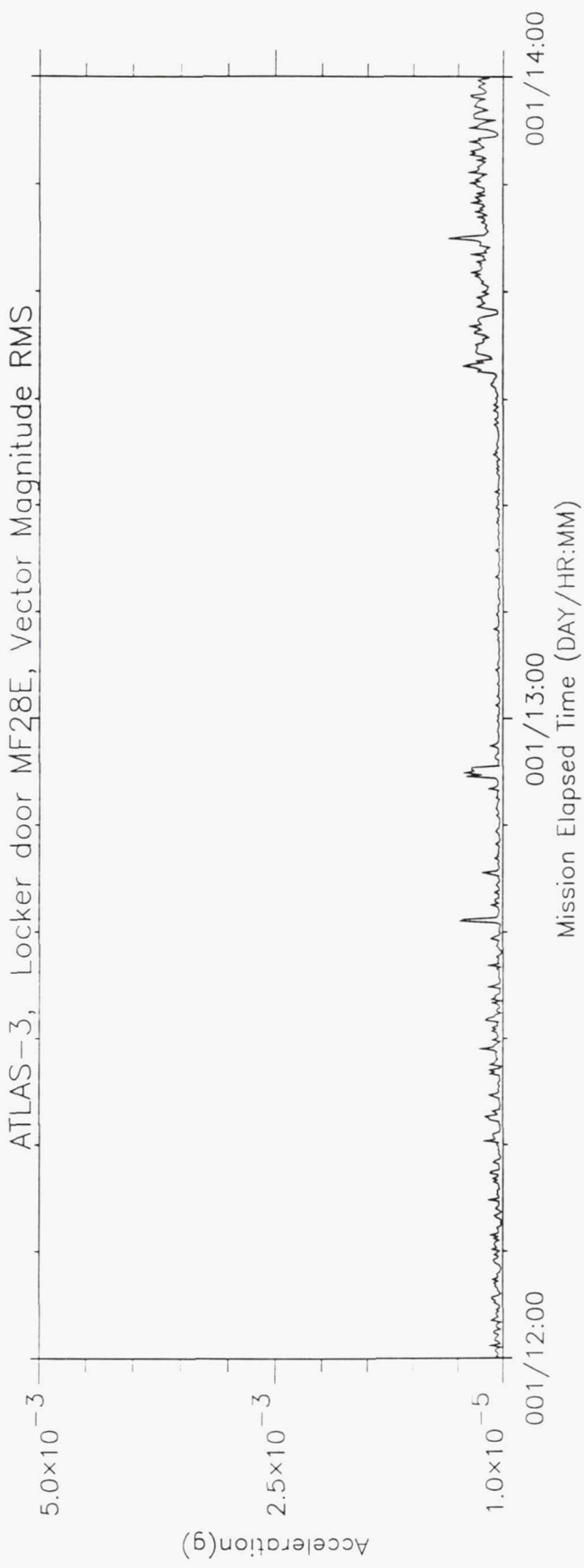
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Acceleration(g)
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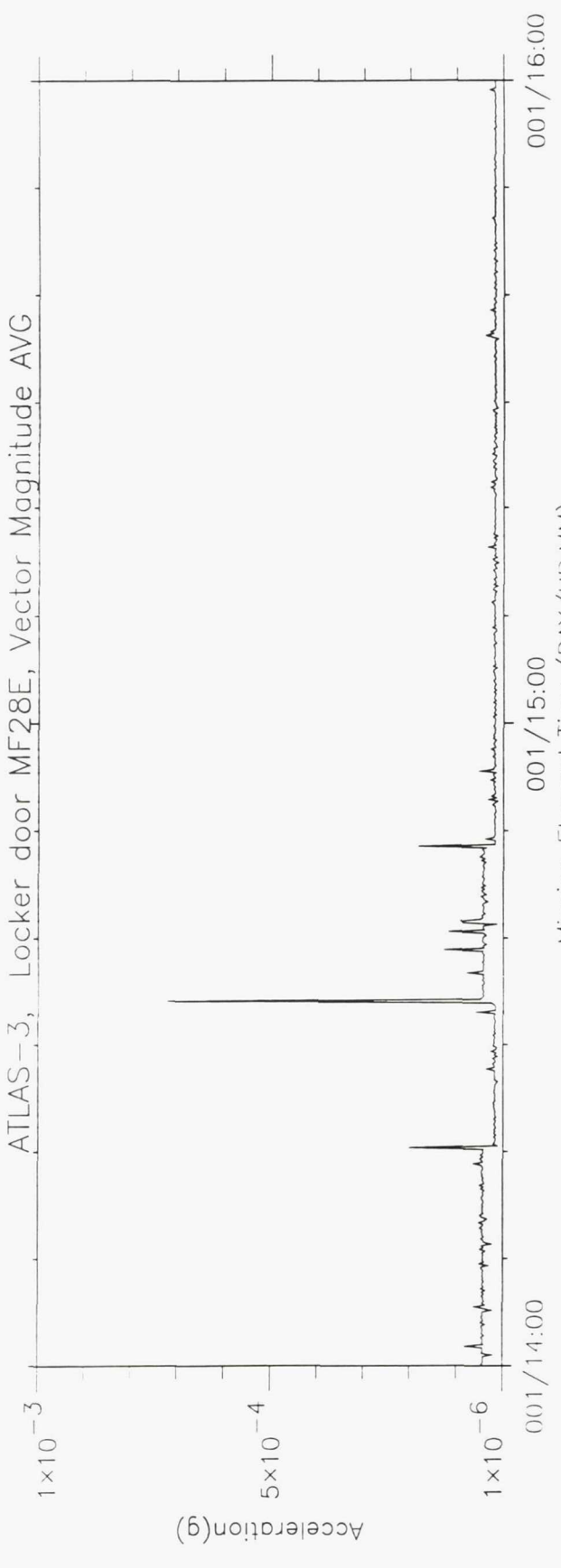
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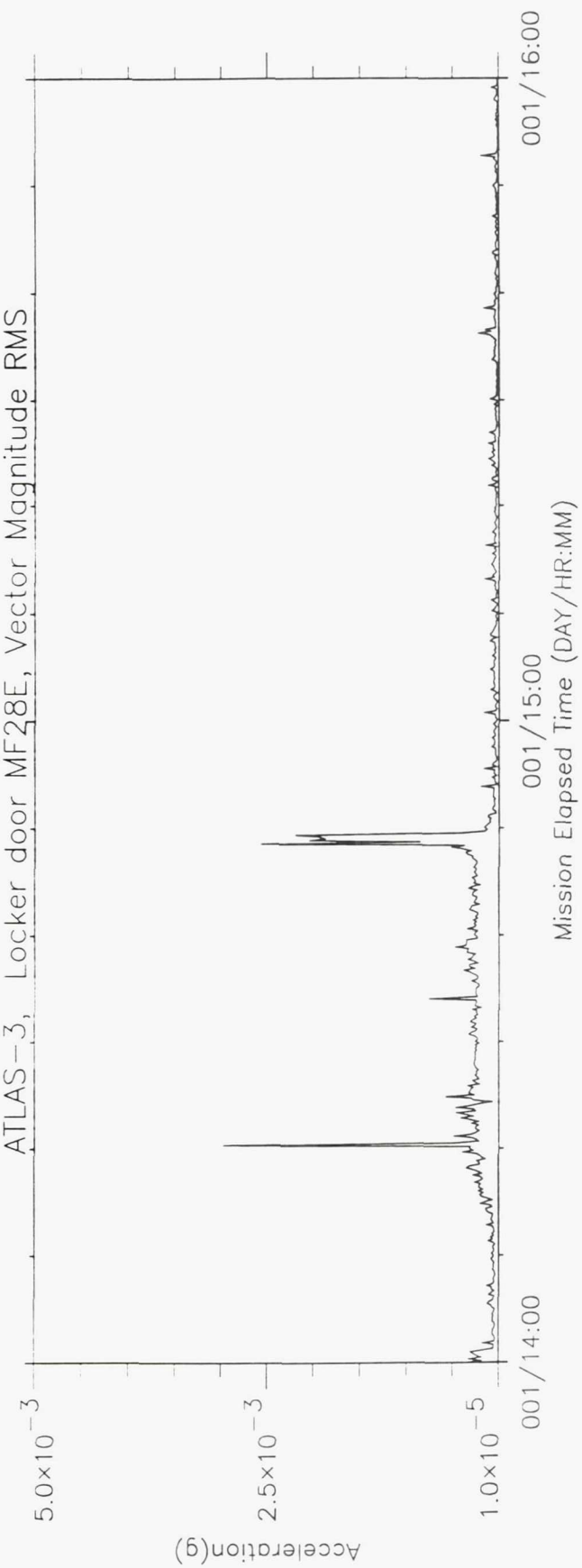
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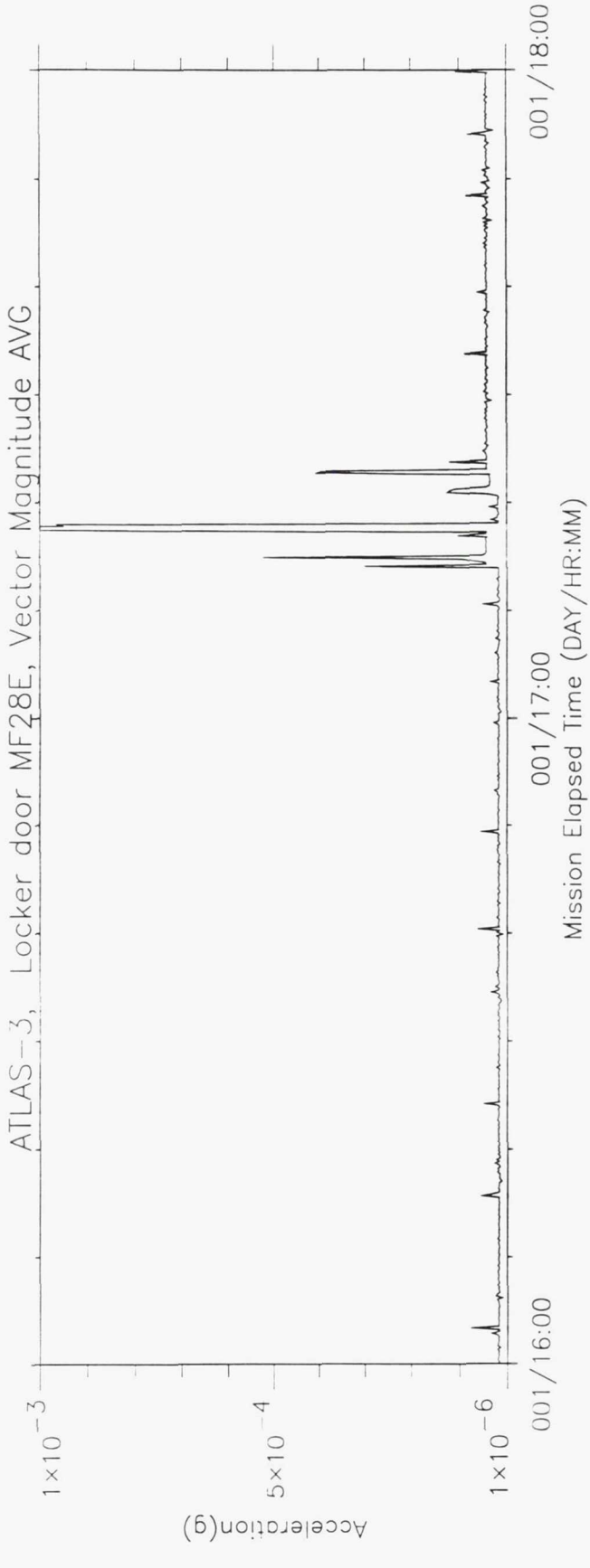
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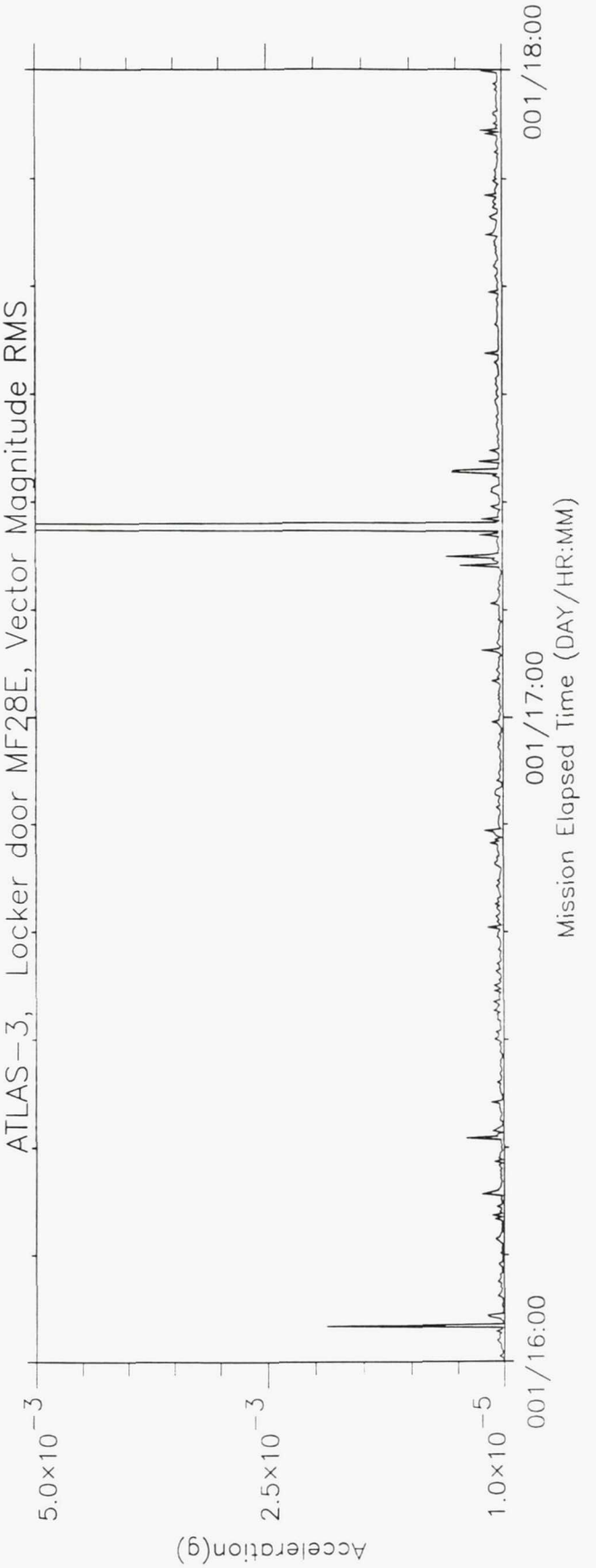
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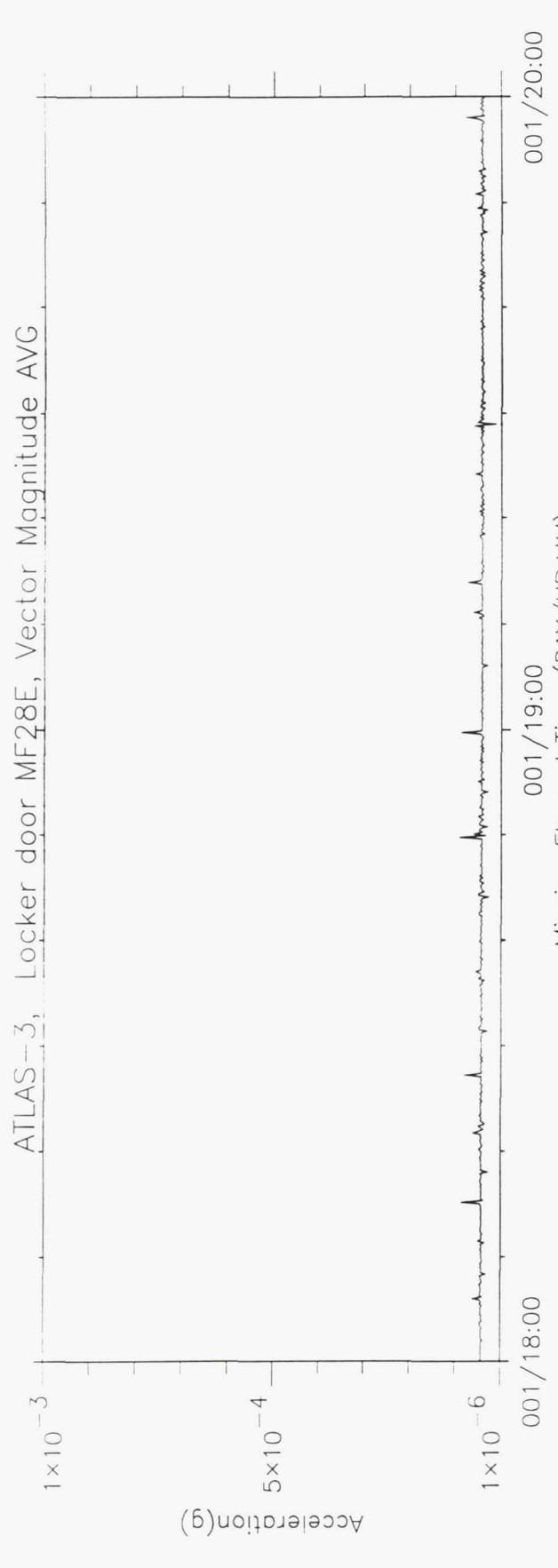
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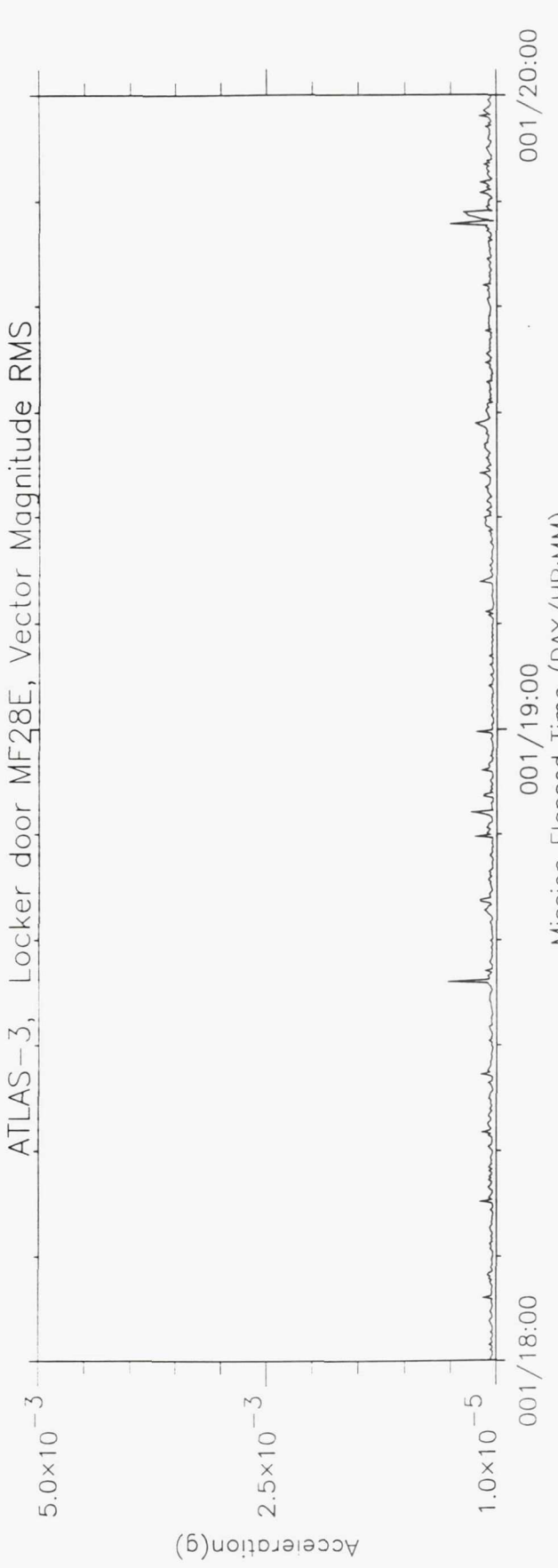
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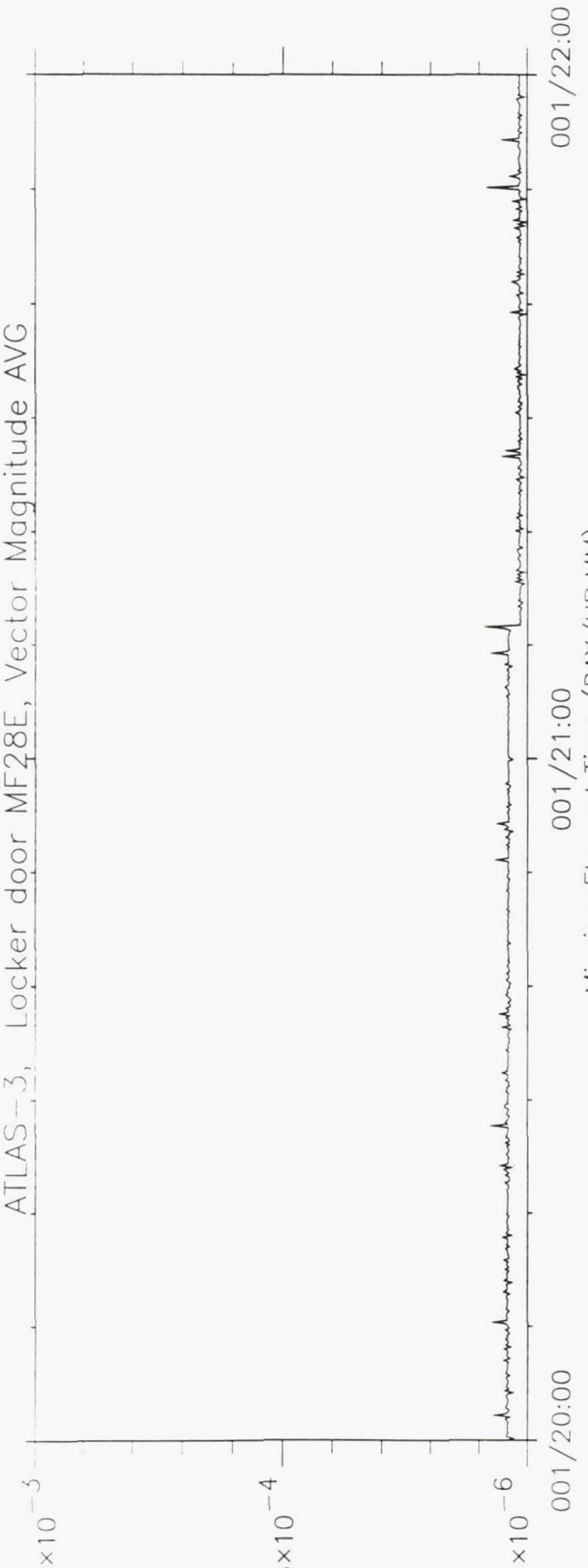
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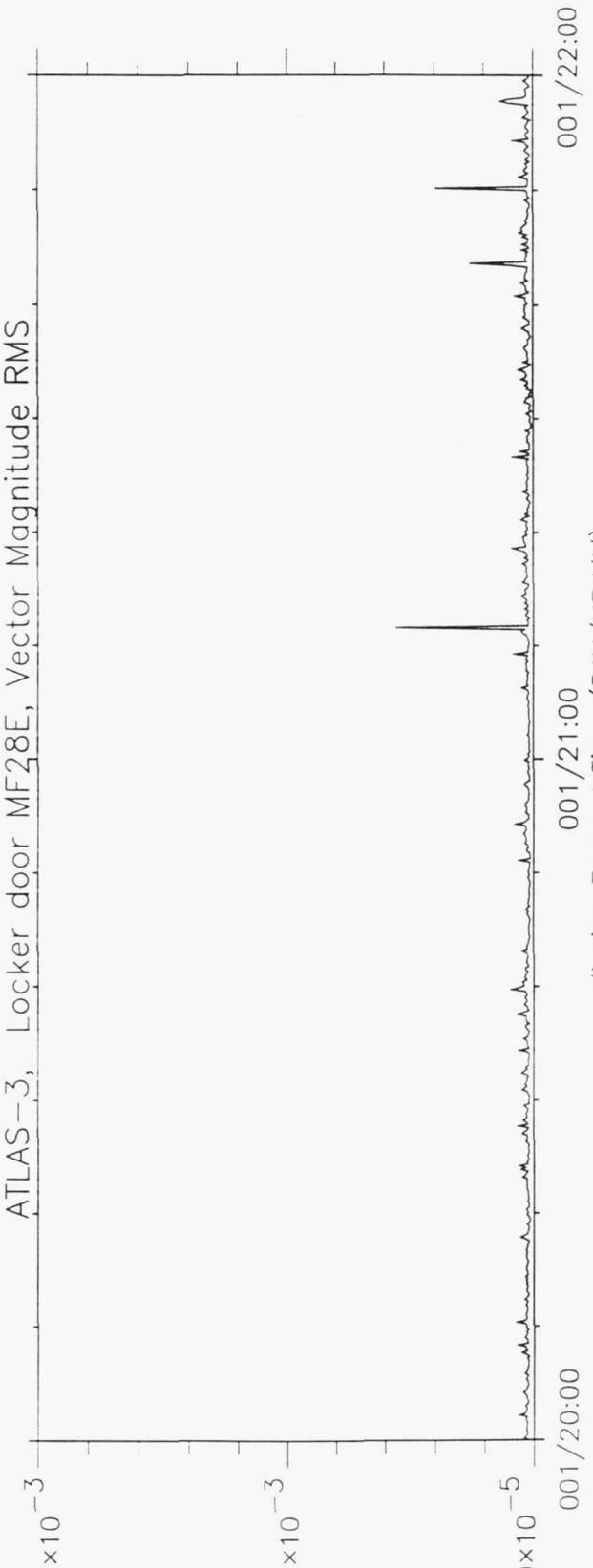
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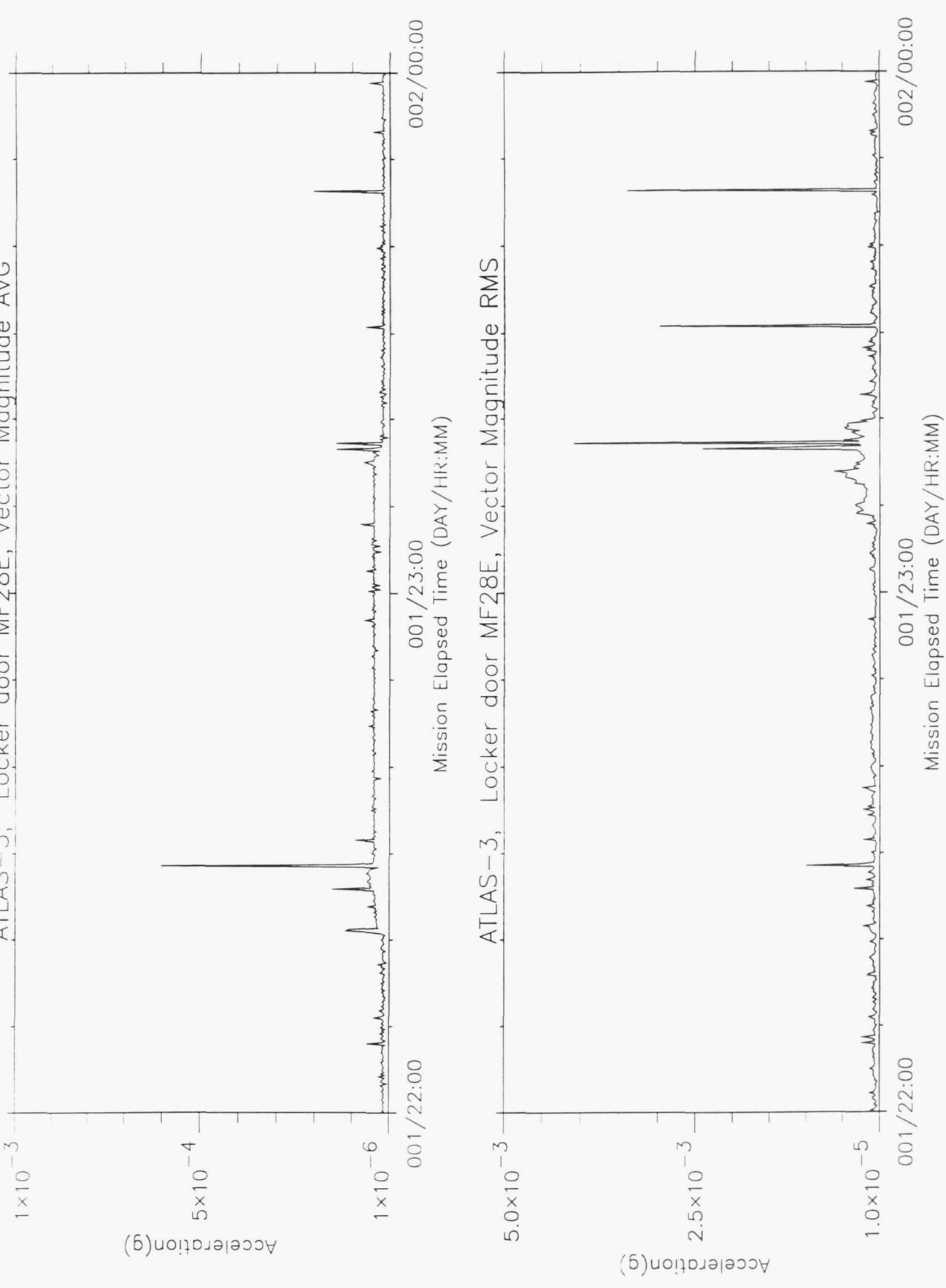
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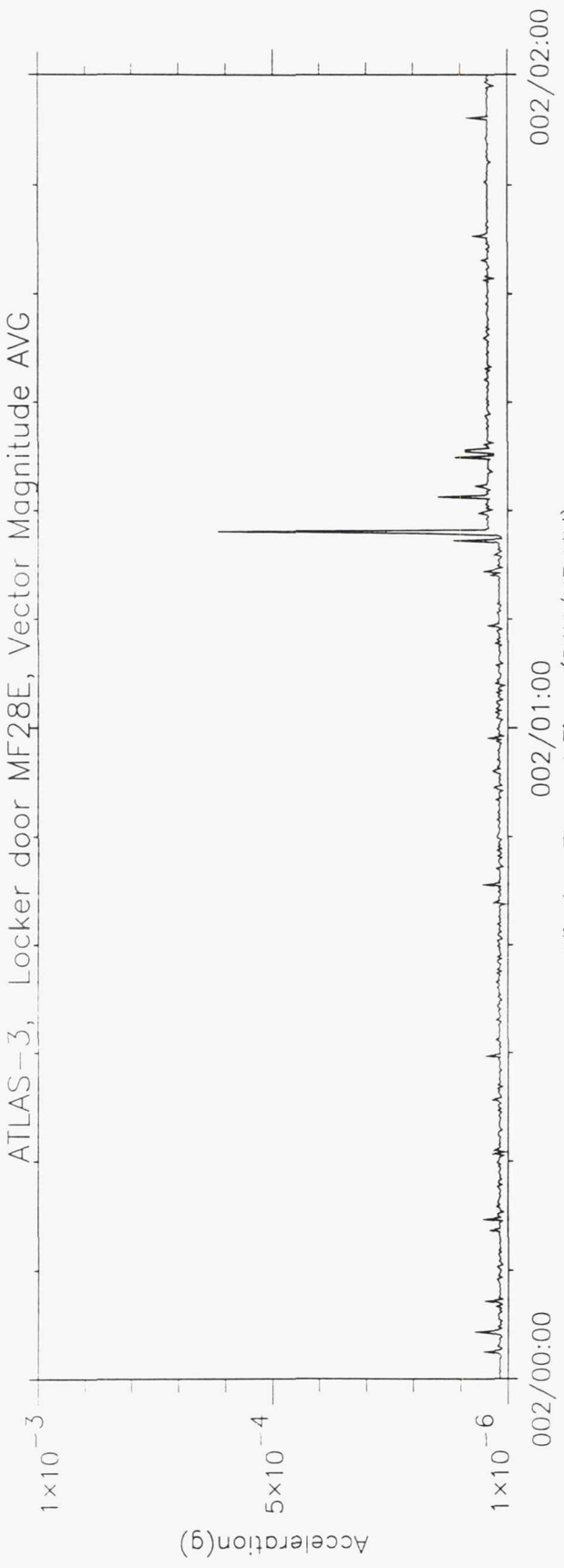
5×10^-4
1×10^-6
Acceleration(g)
001/22:00
001/23:00
002/00:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
2.5×10^-3
1.0×10^-5
Acceleration(g)
001/22:00
001/23:00
002/00:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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Acceleration(g)
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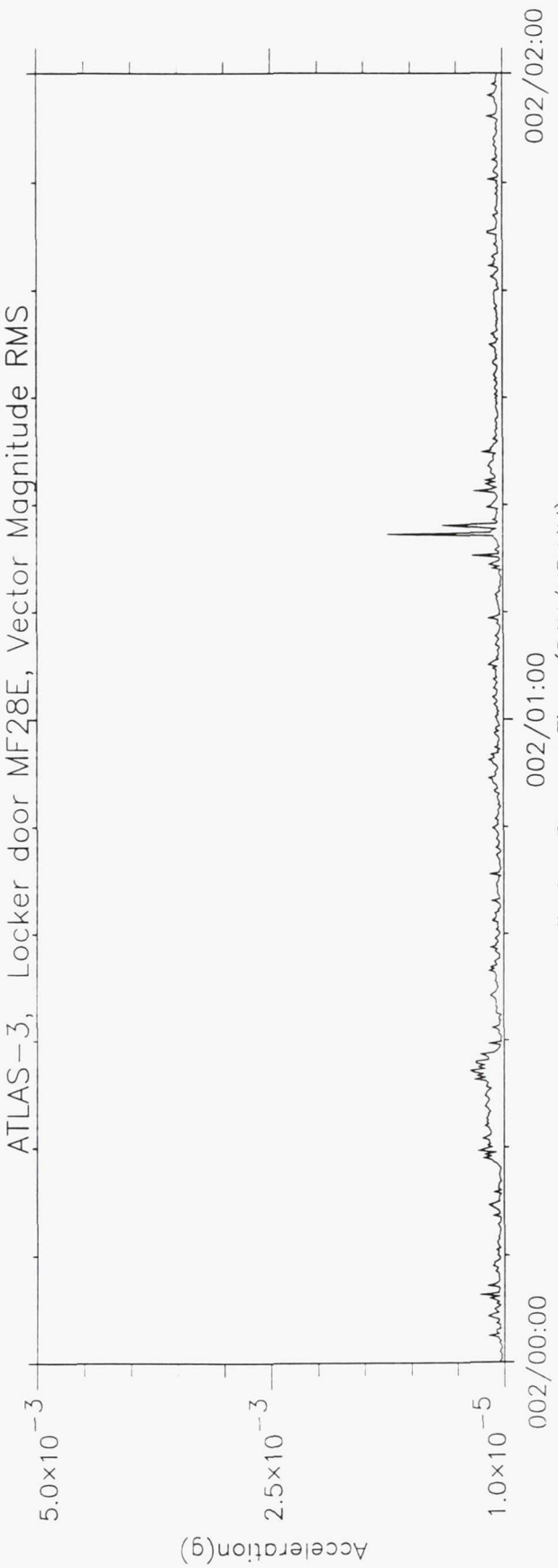
002/01:00
002/02:00
Mission Elapsed Time (DAY/HR:MM)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Acceleration(g)
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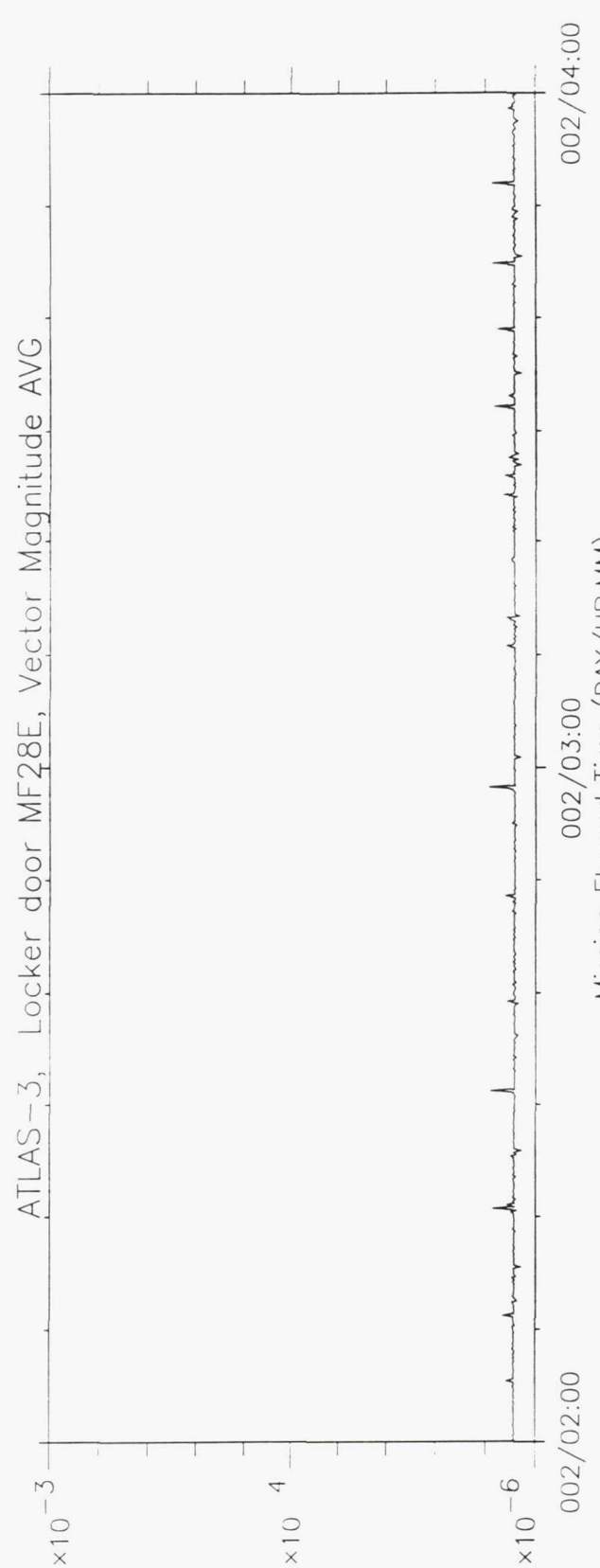
002/01:00
002/02:00
Mission Elapsed Time (DAY/HR:MM)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1×10^-6
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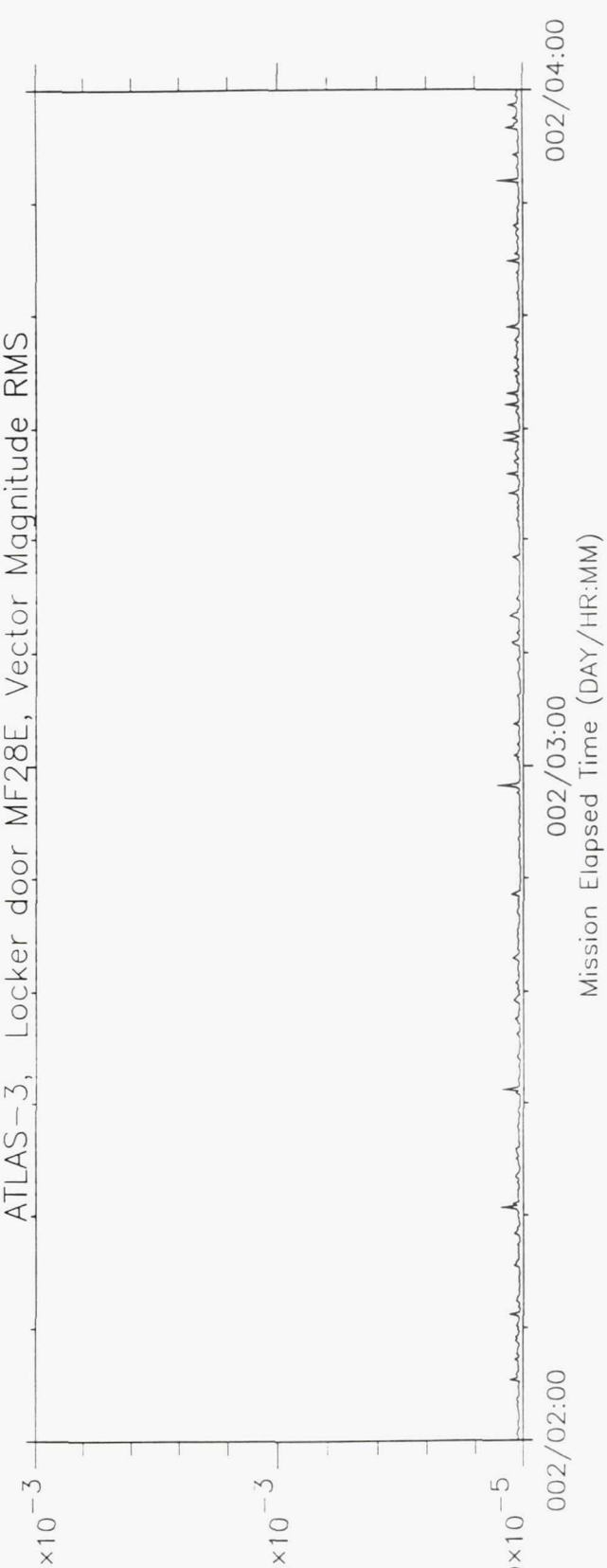
002/04:00
Mission Elapsed Time (DAY/HR:MM)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Acceleration(g)
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1.0×10^-5
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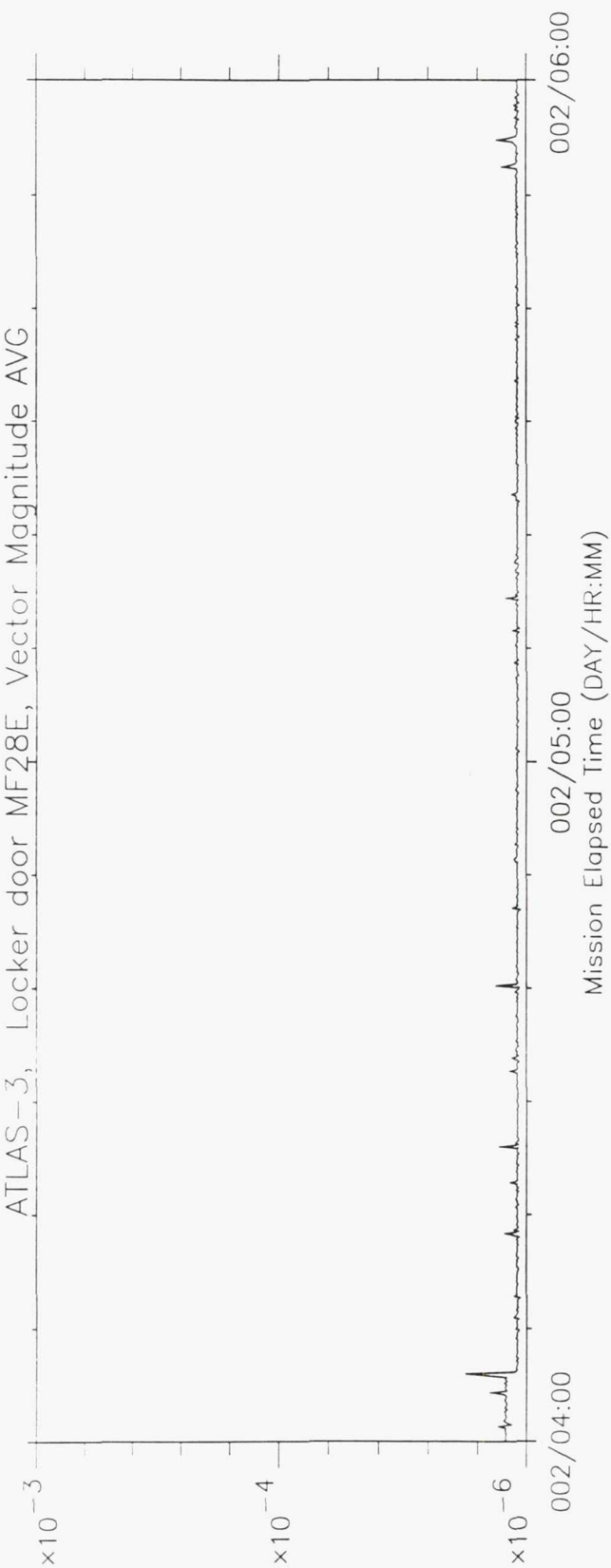
002/04:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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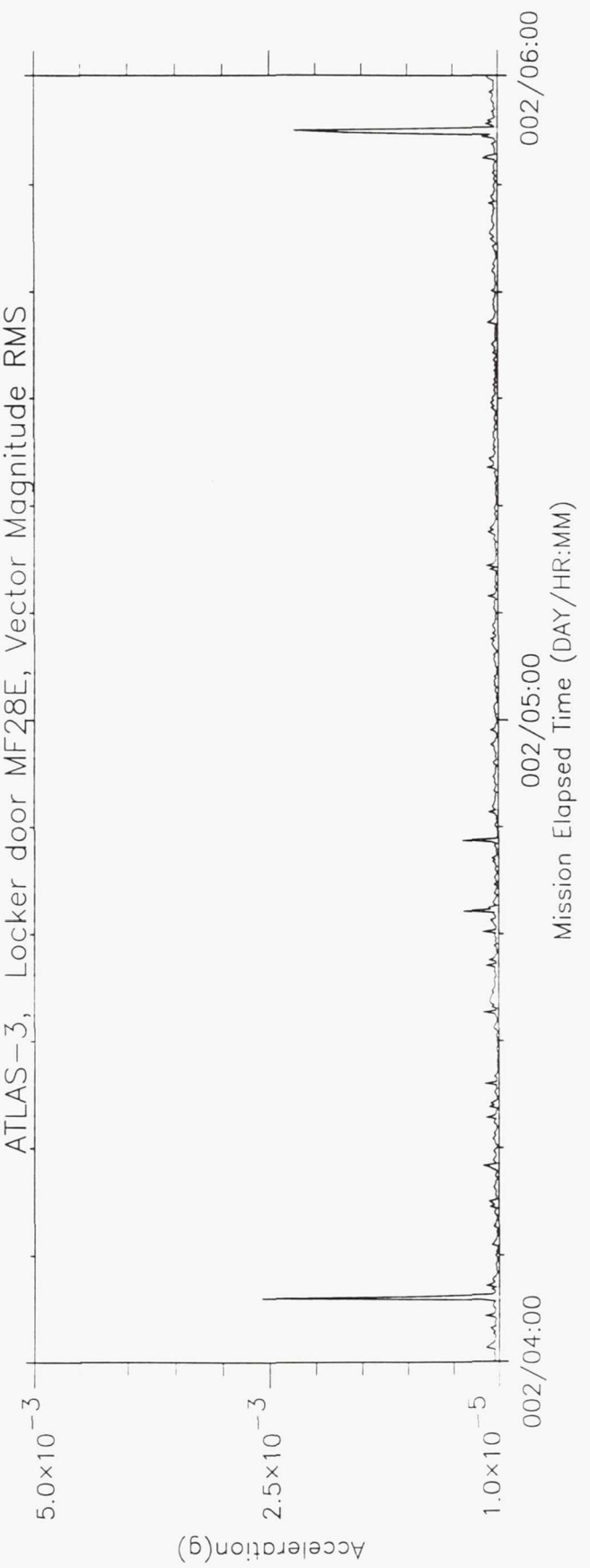
1×10^-6
Acceleration(g)
002/04:00
002/05:00
002/06:00
Mission Elapsed Time (DAY/HR:MM)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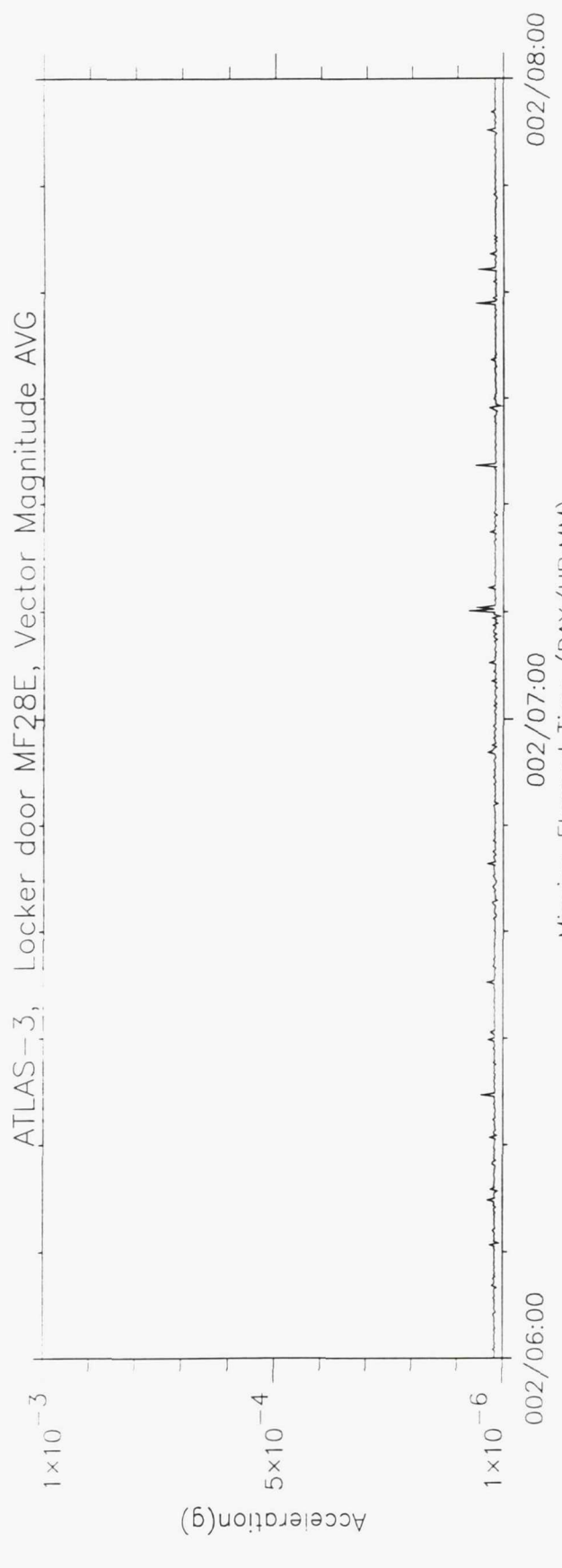
Acceleration(g)
002/04:00
002/05:00
002/06:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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1×10^-6
Acceleration(g)
002/06:00
002/07:00
002/08:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
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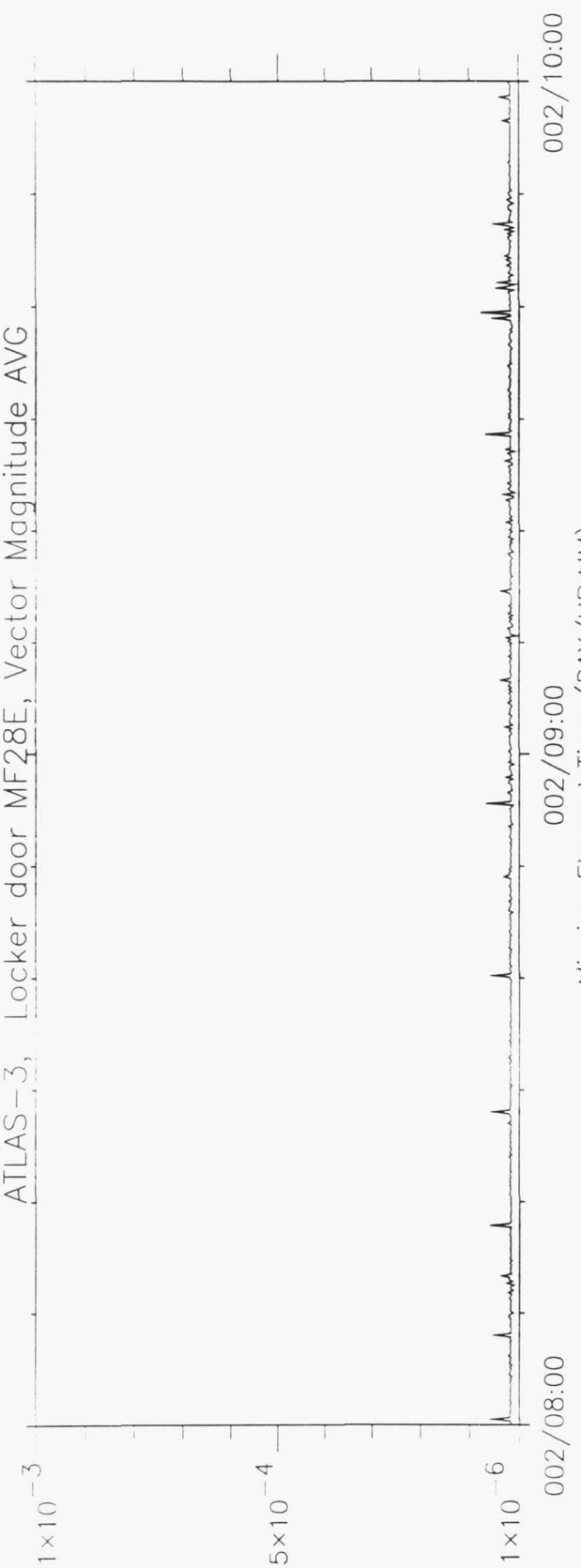
Acceleration(g)
002/06:00
002/07:00
002/08:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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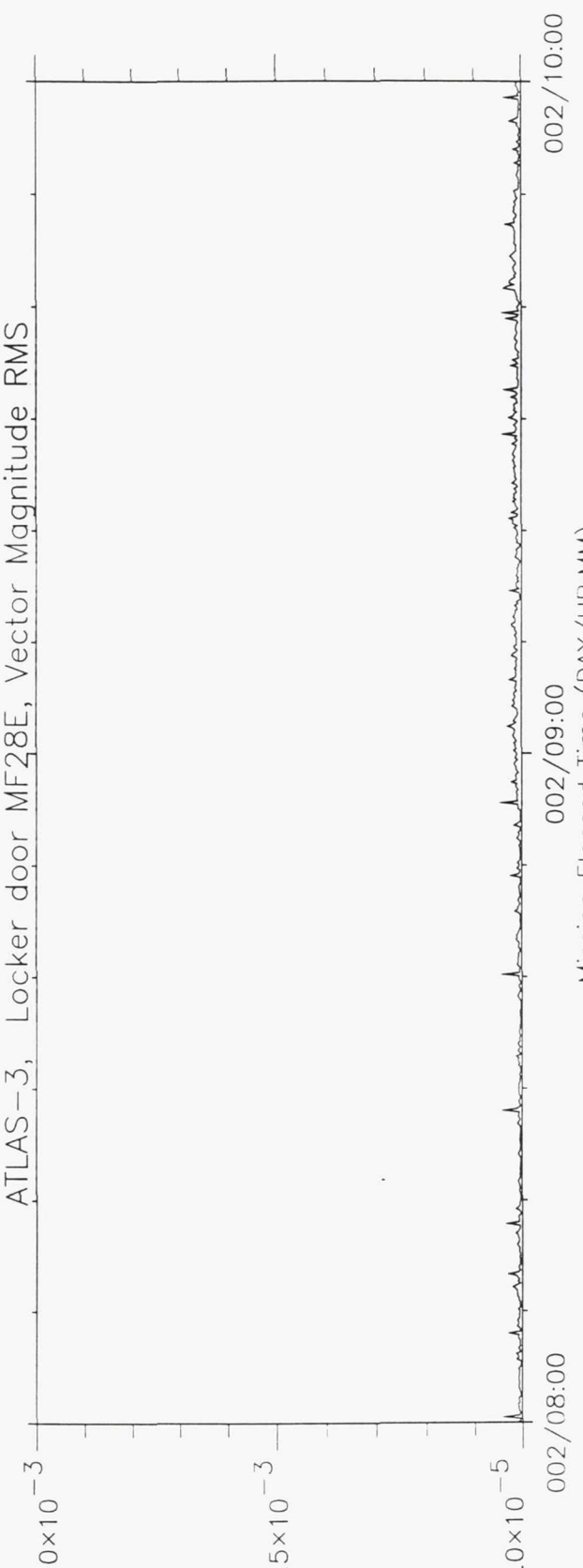
Acceleration(g)
002/08:00
002/09:00
002/10:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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Acceleration(g)
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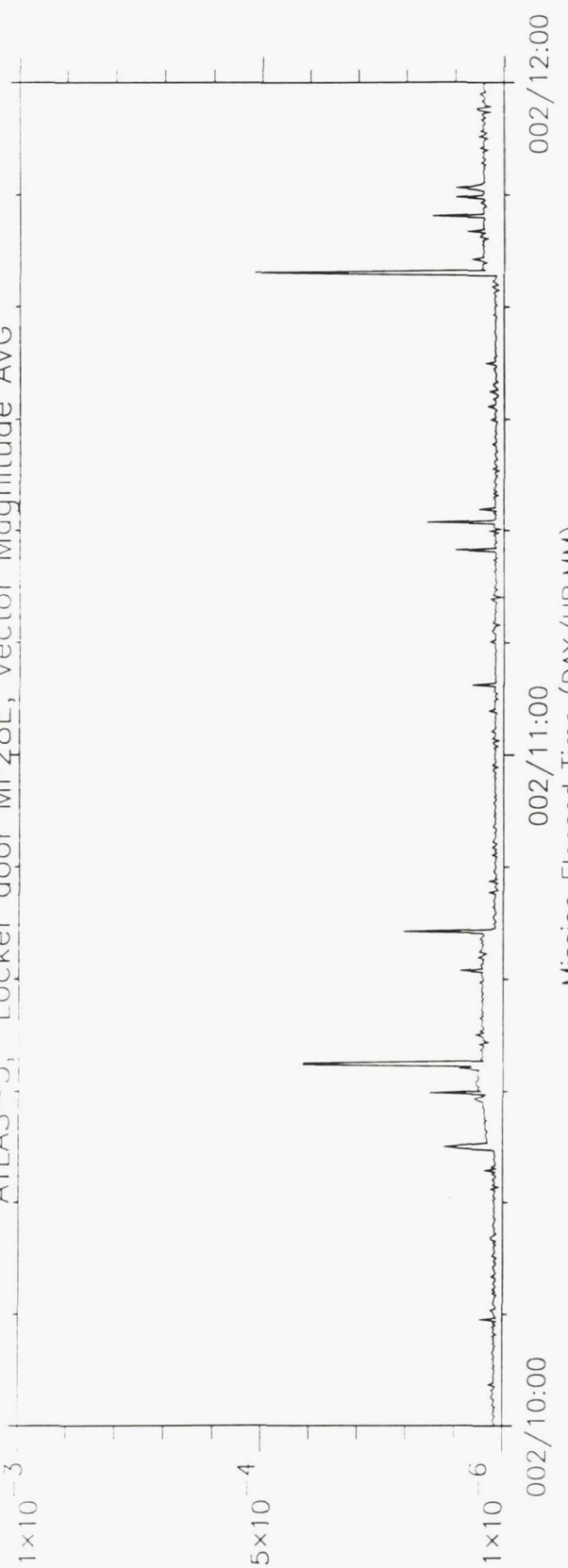
002/10:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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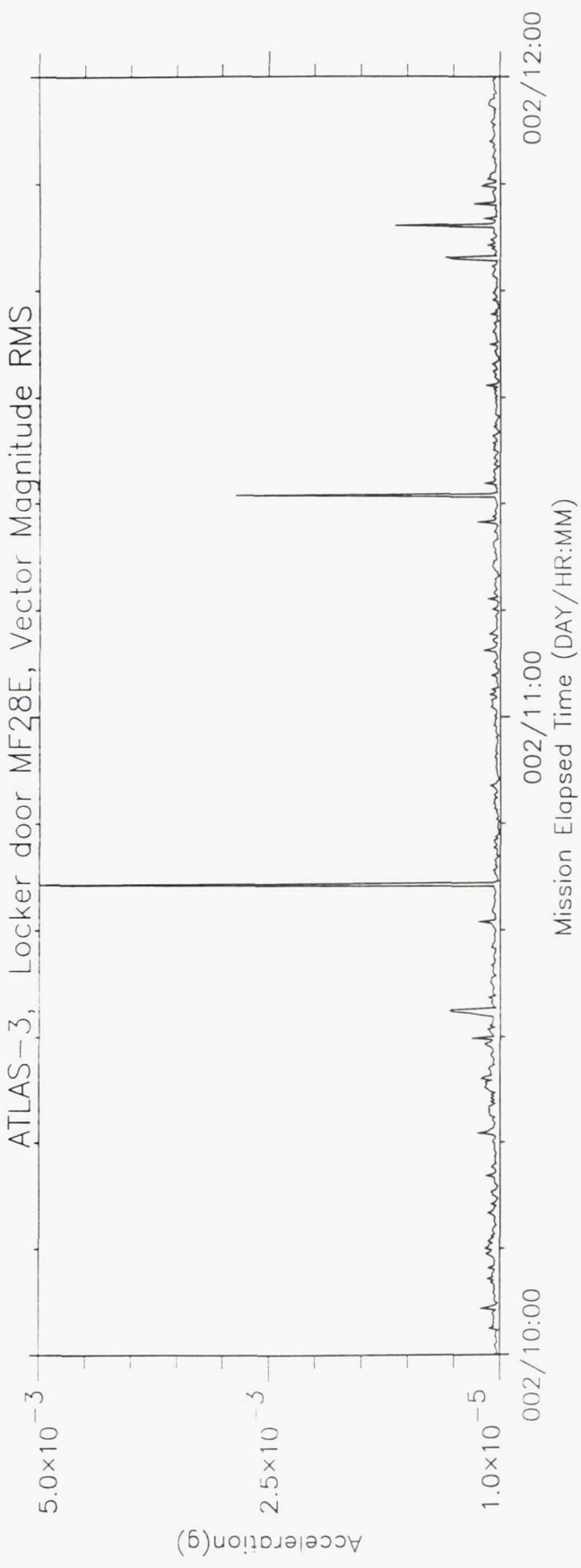
1×10^-6
Acceleration(g)
002/10:00
002/11:00
002/12:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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Acceleration(g)
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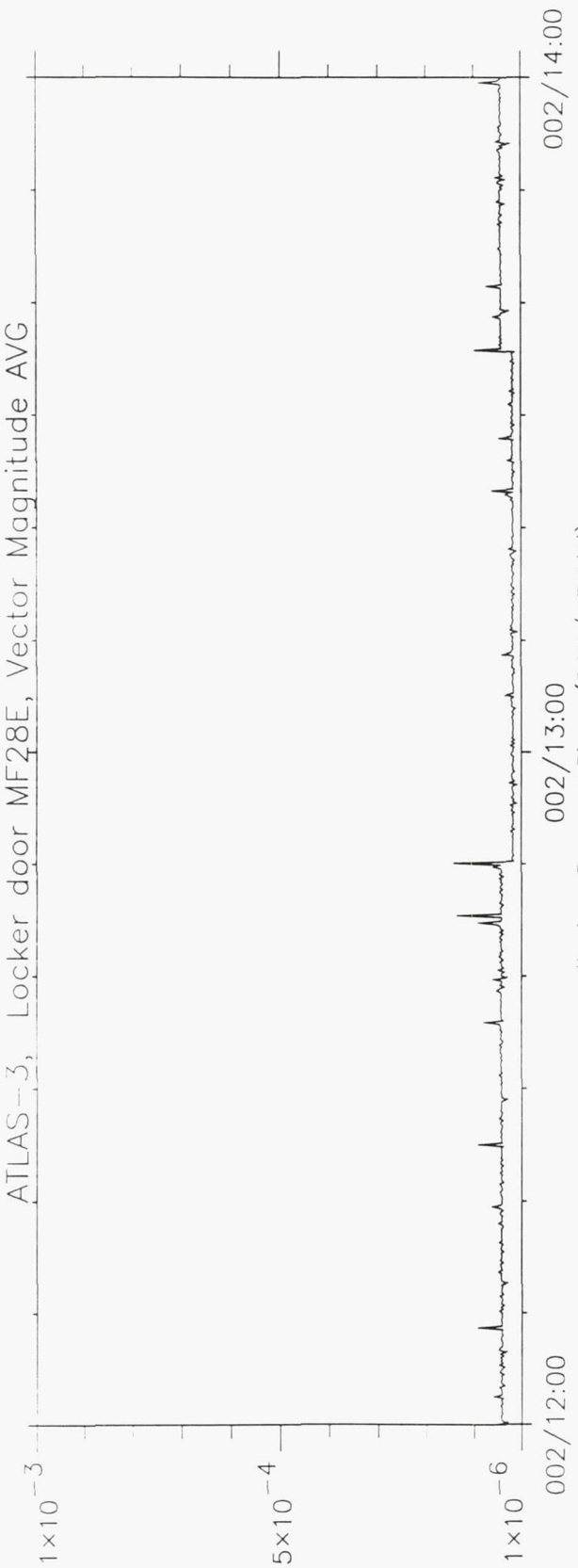
002/12:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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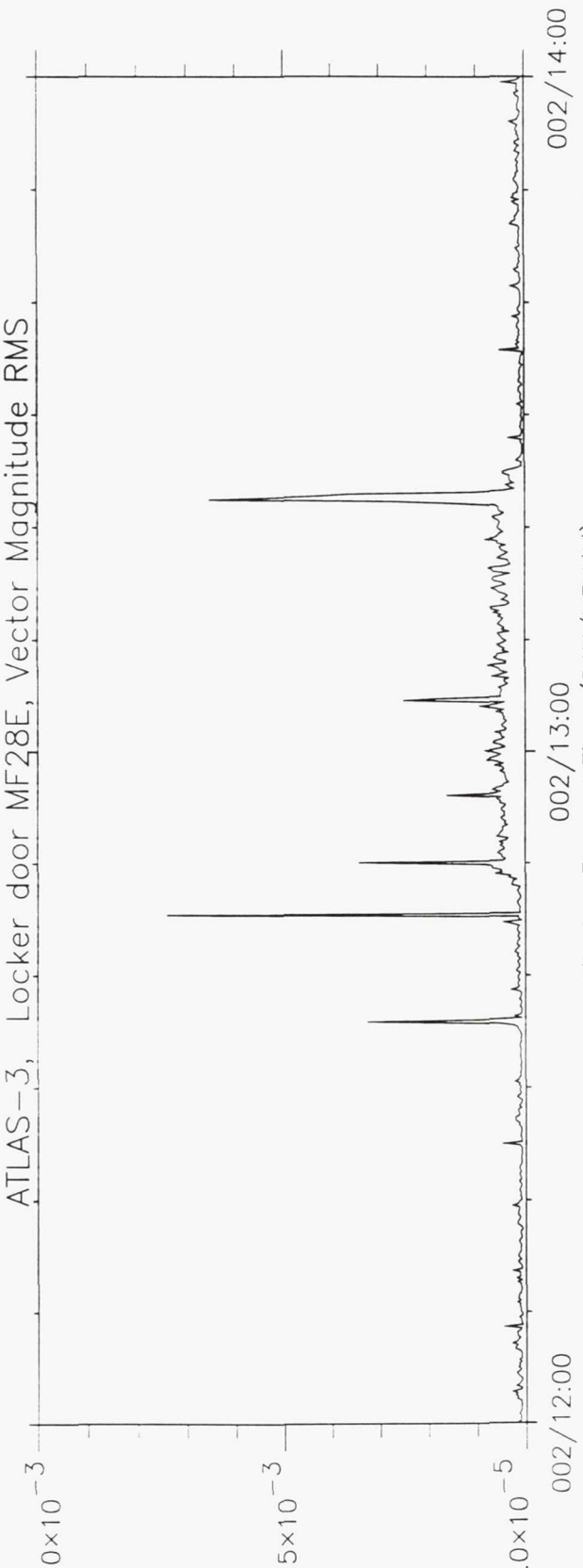
1×10^-6
Acceleration(g)
002/12:00
002/13:00
002/14:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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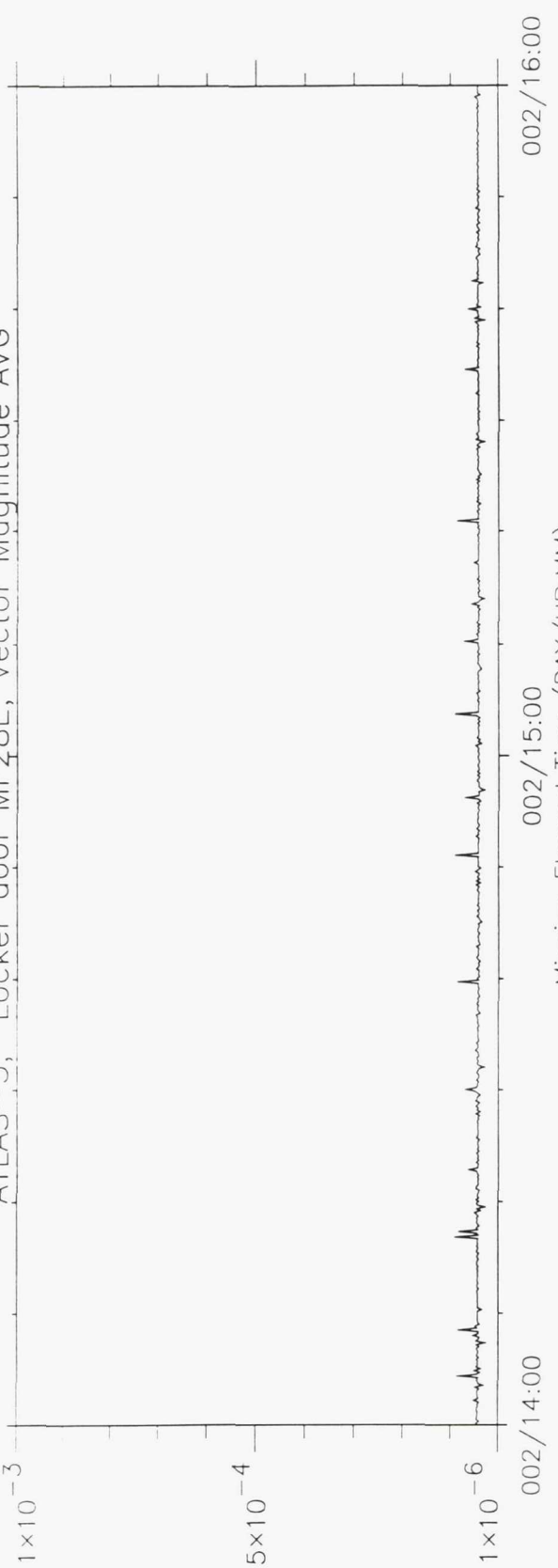
Acceleration(g)
002/12:00
002/13:00
002/14:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
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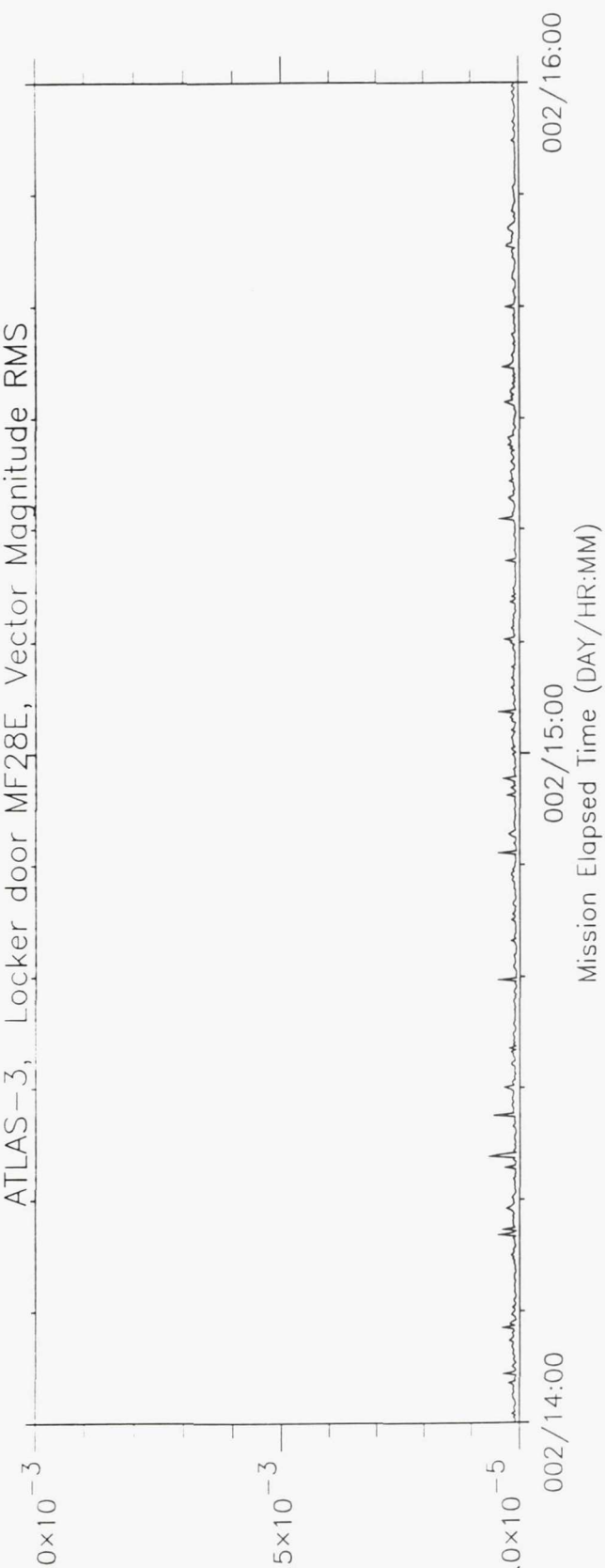
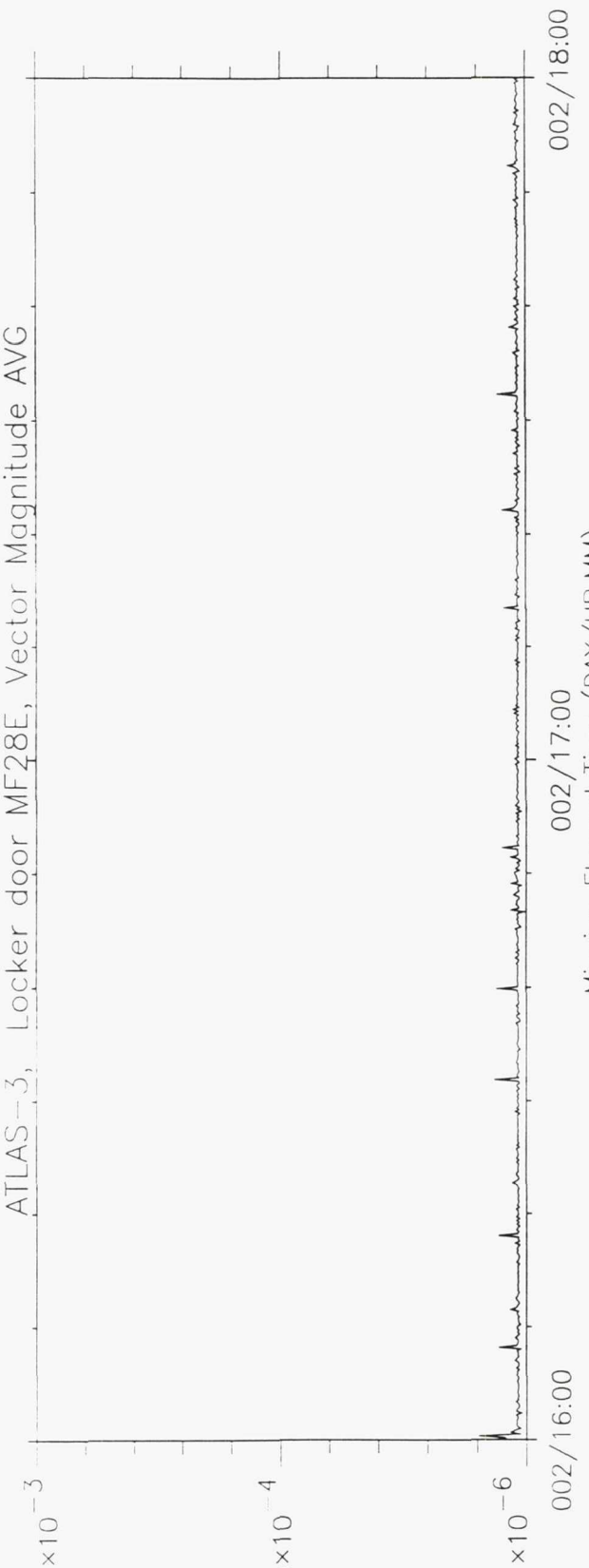
5×10⁻⁴
1×10⁻⁶
002/14:00
002/15:00
002/16:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
002/14:00
002/15:00
002/16:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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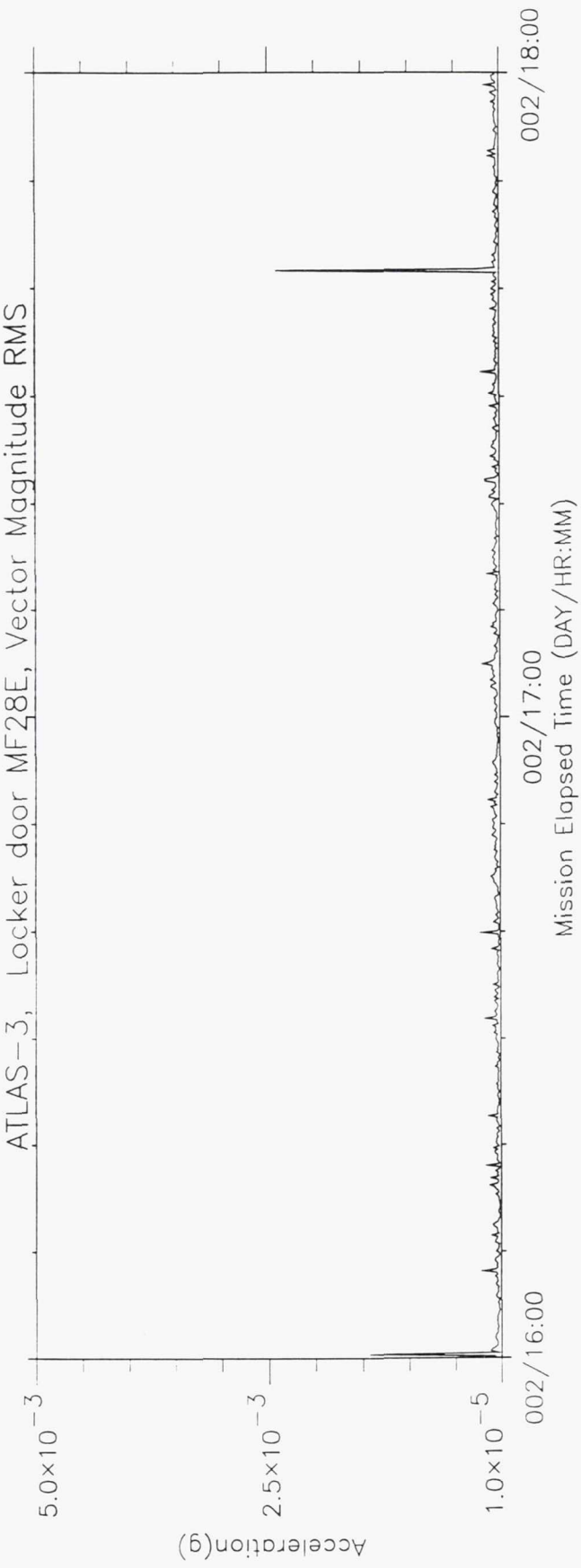
1×10^-6
Acceleration(g)
002/16:00
002/17:00
002/18:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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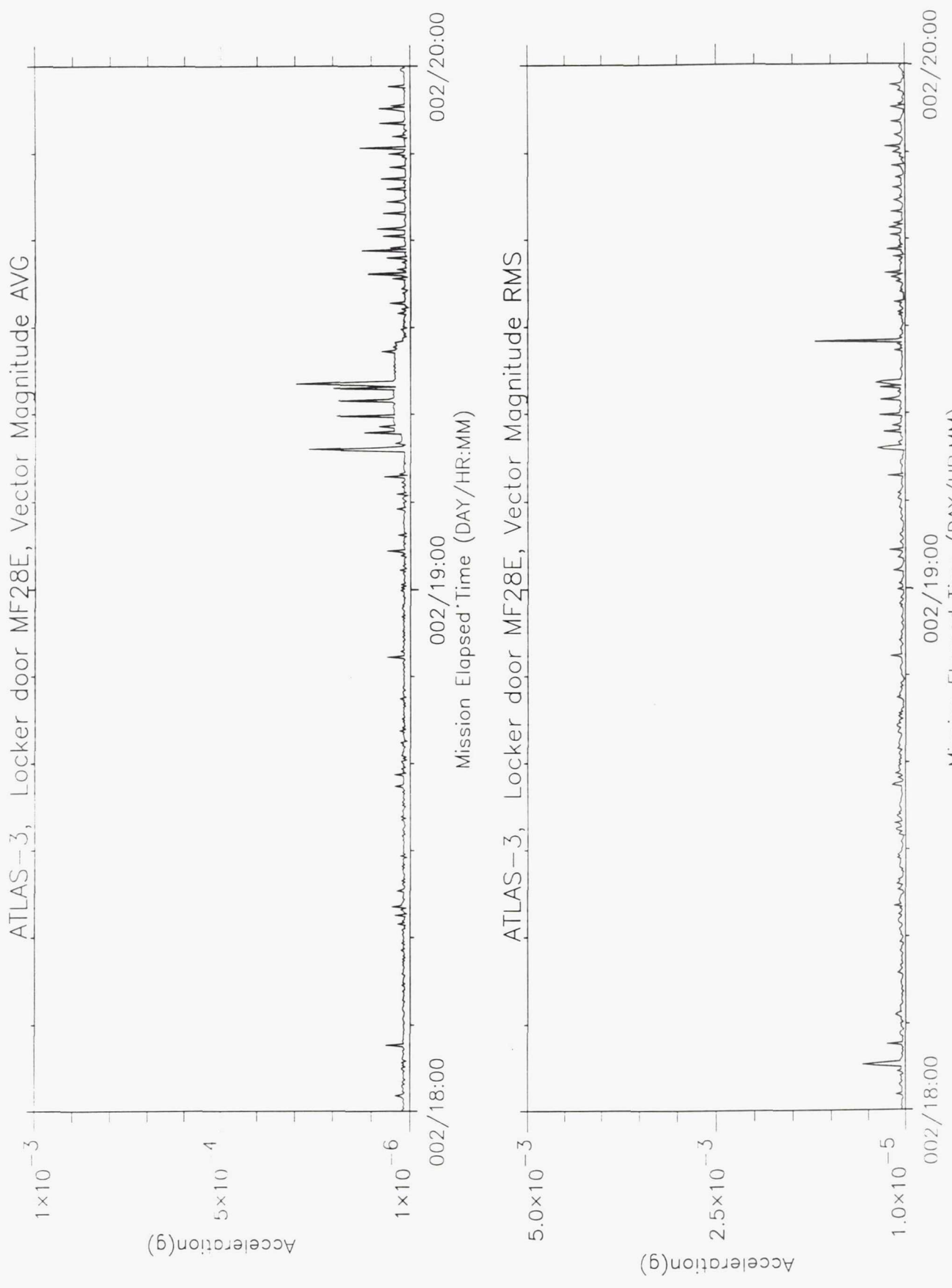
Acceleration(g)
002/16:00
002/17:00
002/18:00
Mission Elapsed Time (DAY/HR:MM)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1×10^-6
Acceleration(g)
002/18:00
002/19:00
002/20:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
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Acceleration(g)
002/18:00
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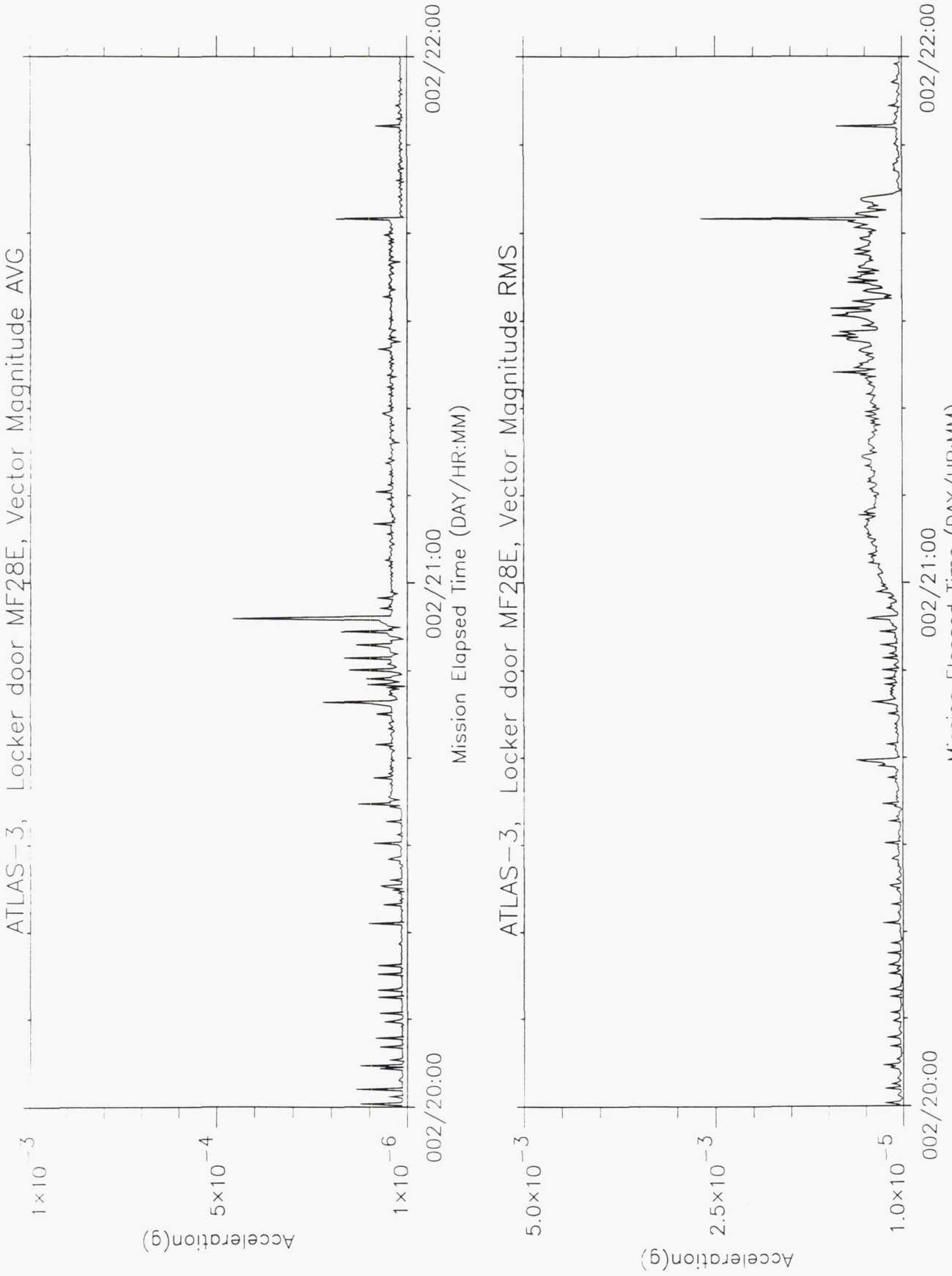
ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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1×10^-6
Acceleration(g)
002/20:00
002/21:00
002/22:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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Acceleration(g)
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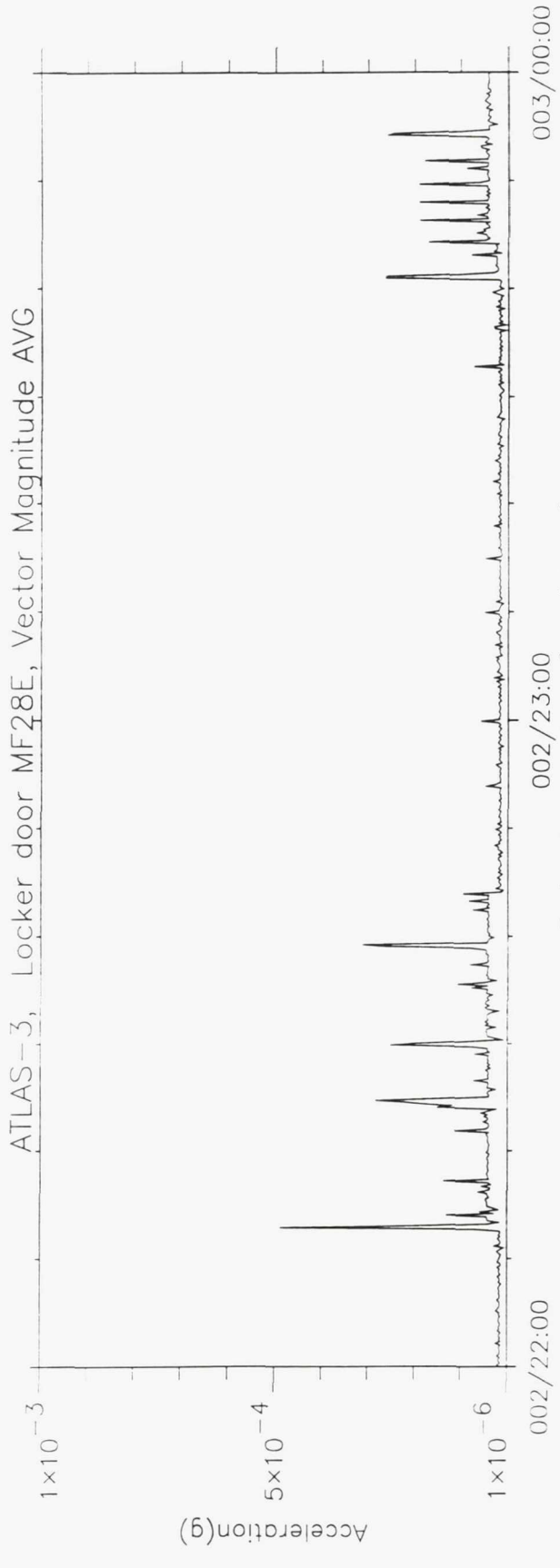
002/22:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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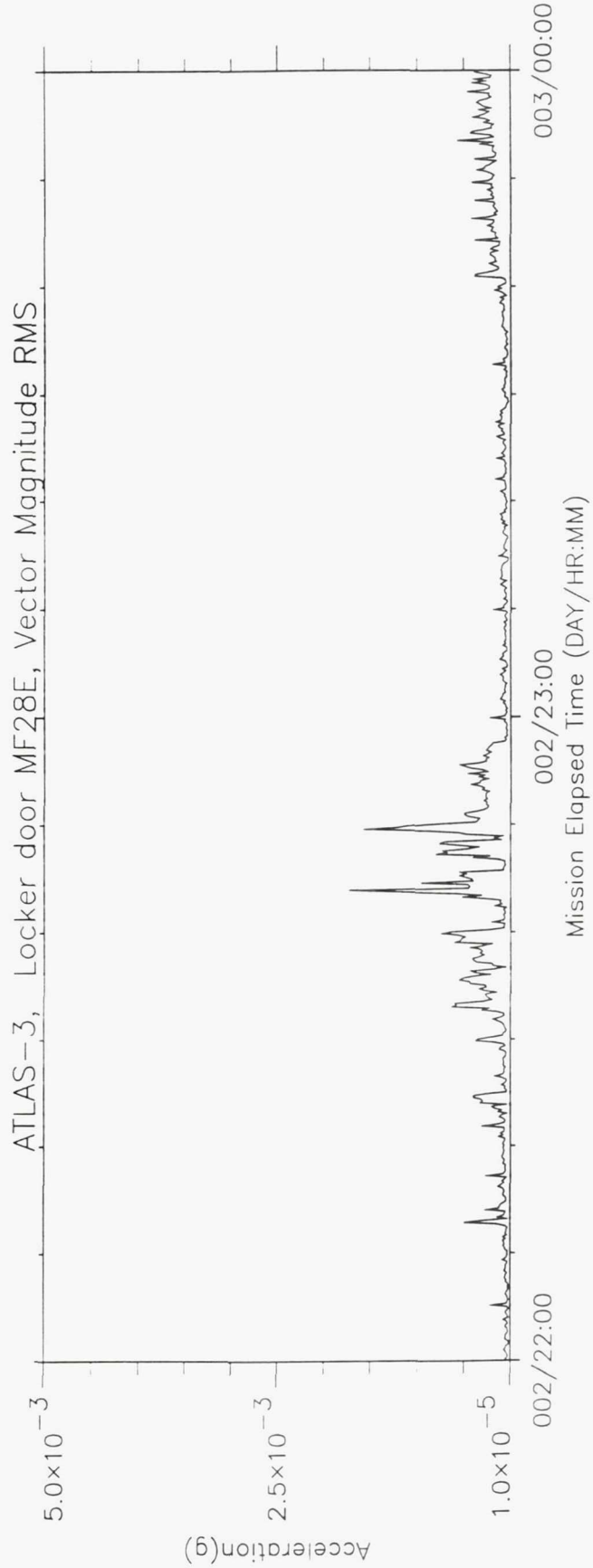
1×10^-6
Acceleration(g)
002/22:00
002/23:00
003/00:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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Acceleration(g)
002/22:00
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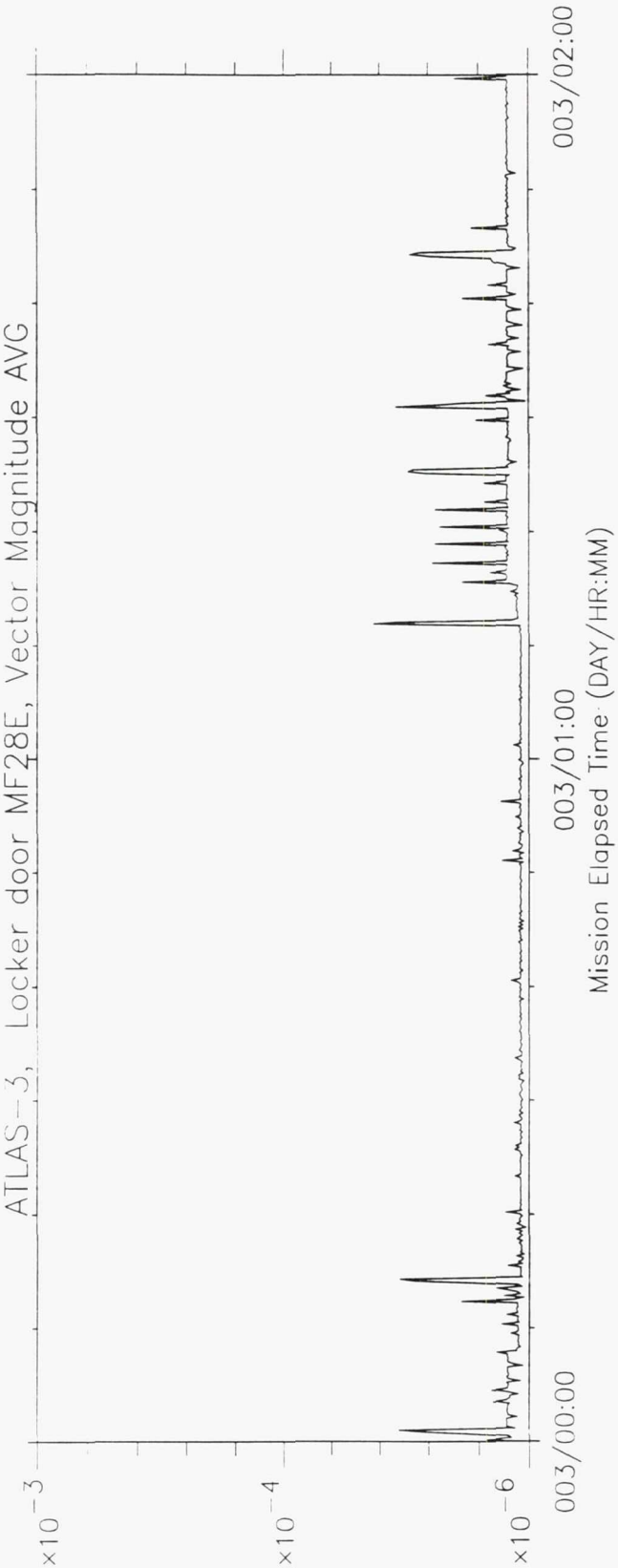
003/00:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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Acceleration(g)
003/00:00
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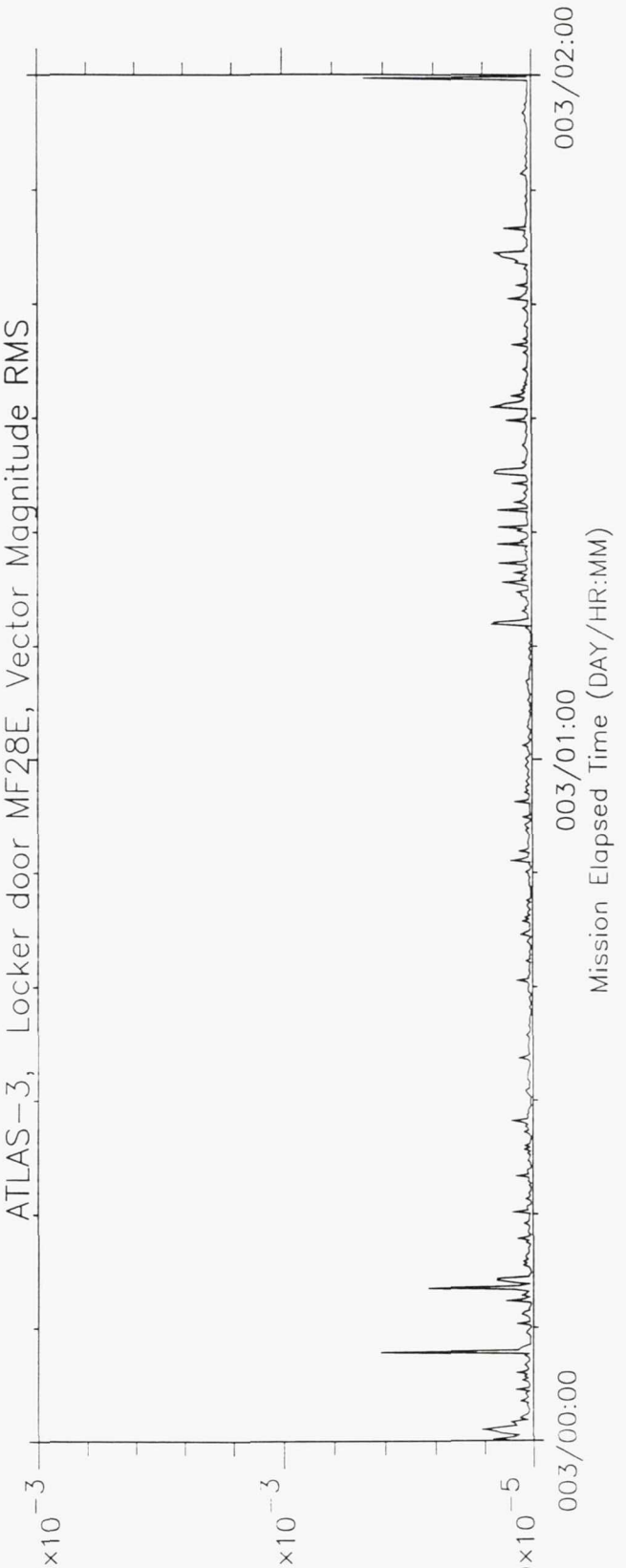
003/02:00
Mission Elapsed Time (DAY/HR:MM)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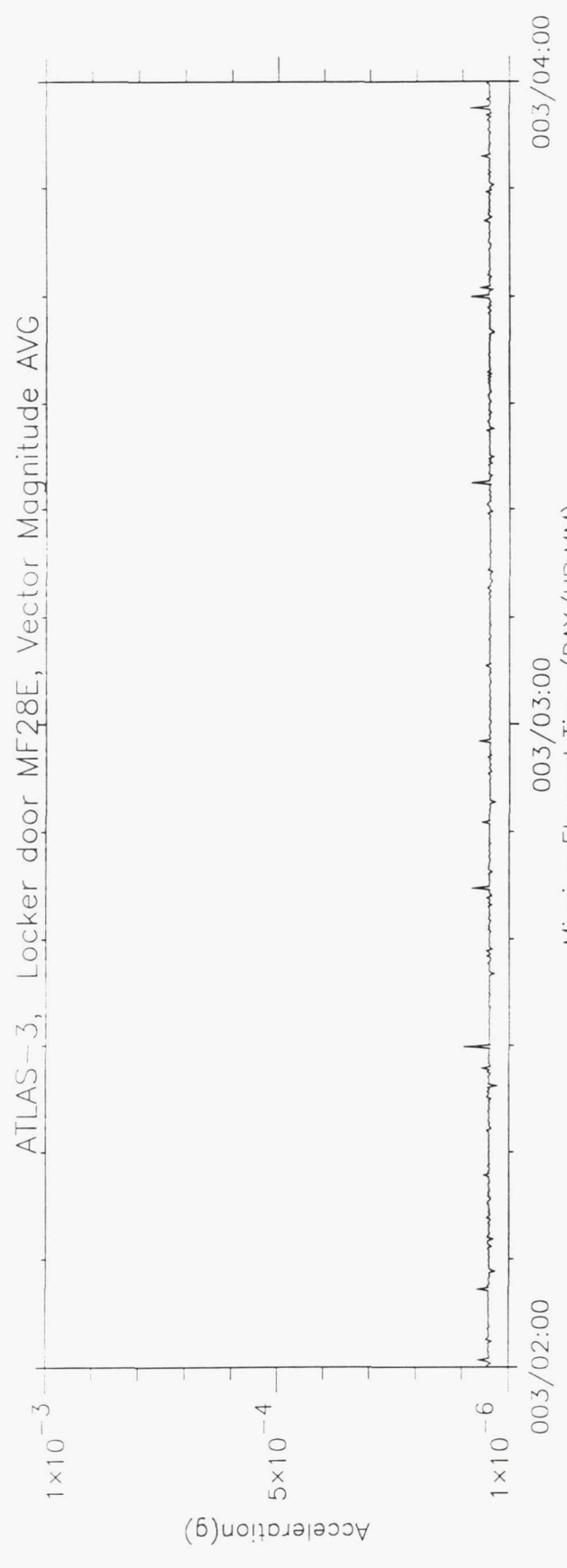
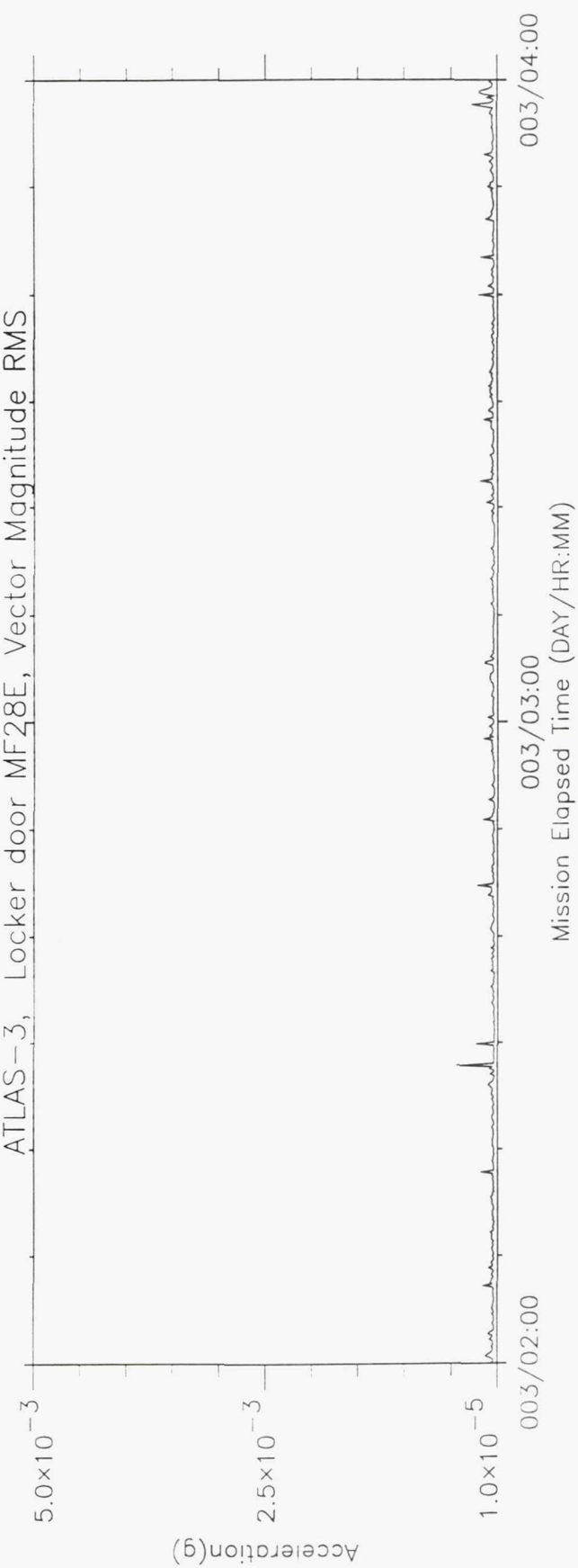
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10⁻³
5×10⁻⁴
1×10⁻⁶
Acceleration(g)
003/02:00
003/03:00
003/04:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10⁻³
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1.0×10⁻⁵
Acceleration(g)
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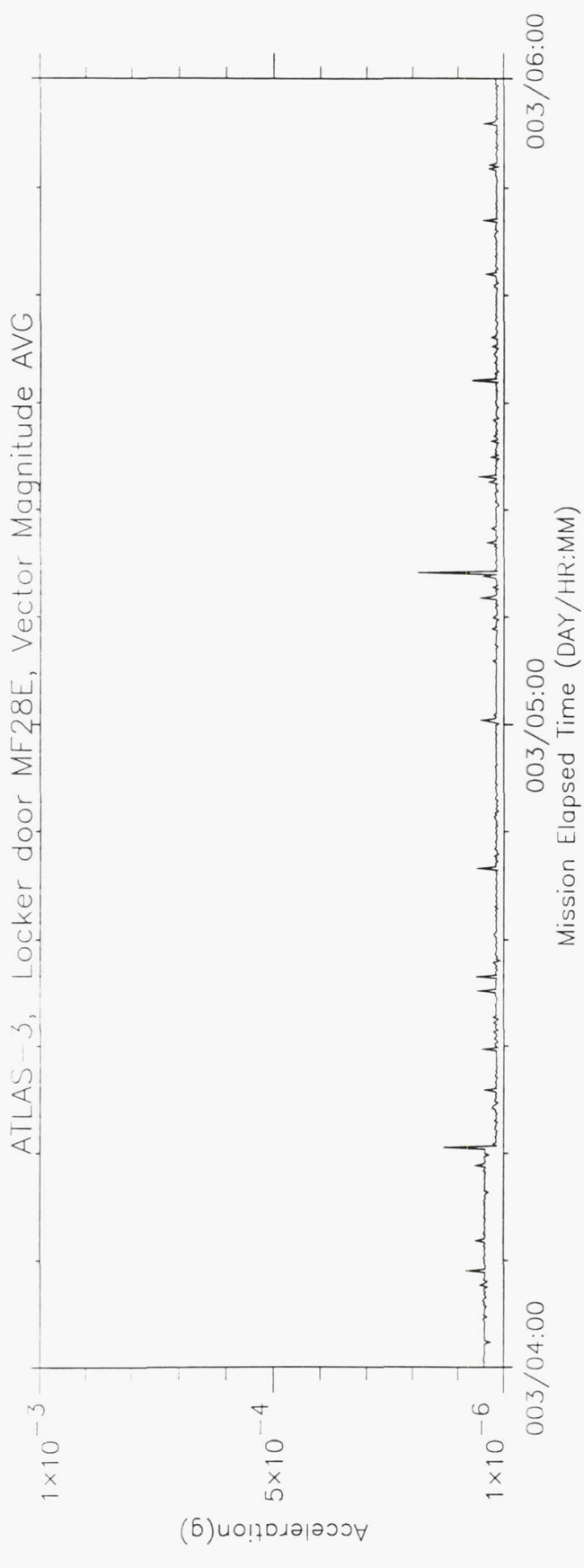
003/03:00
003/04:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
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1×10⁻⁶
003/04:00
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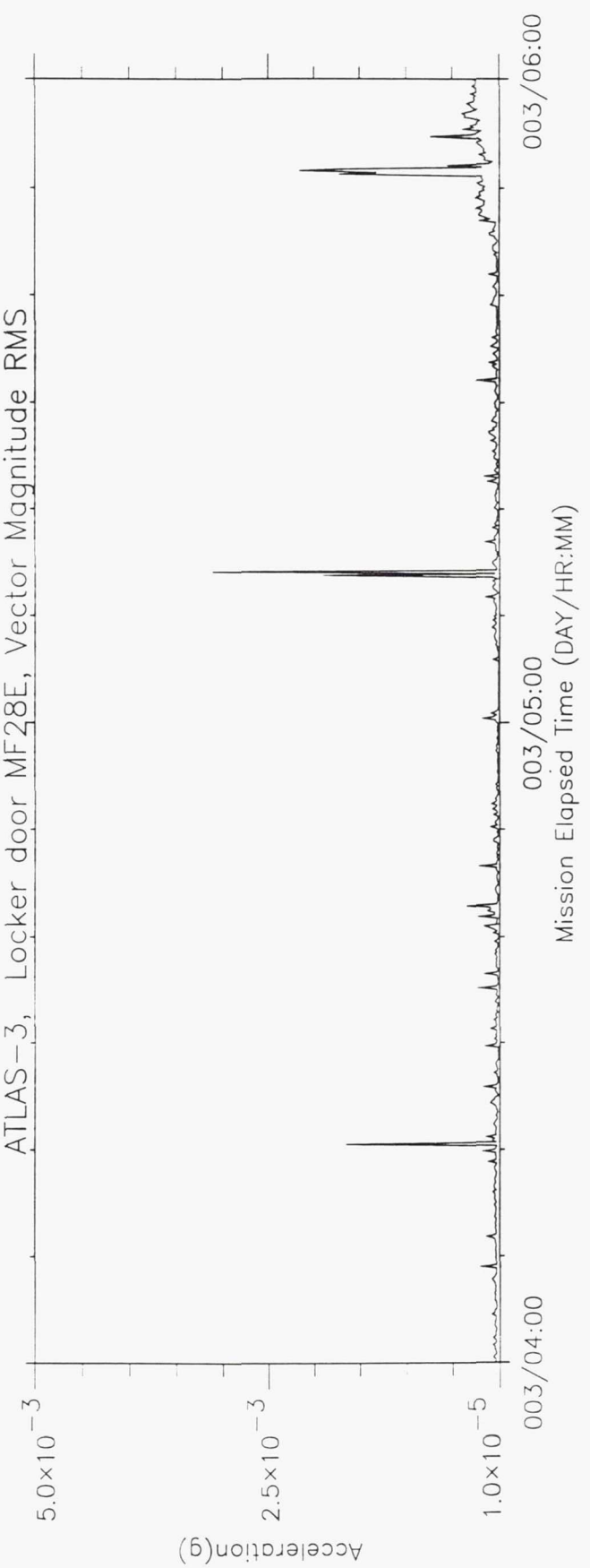
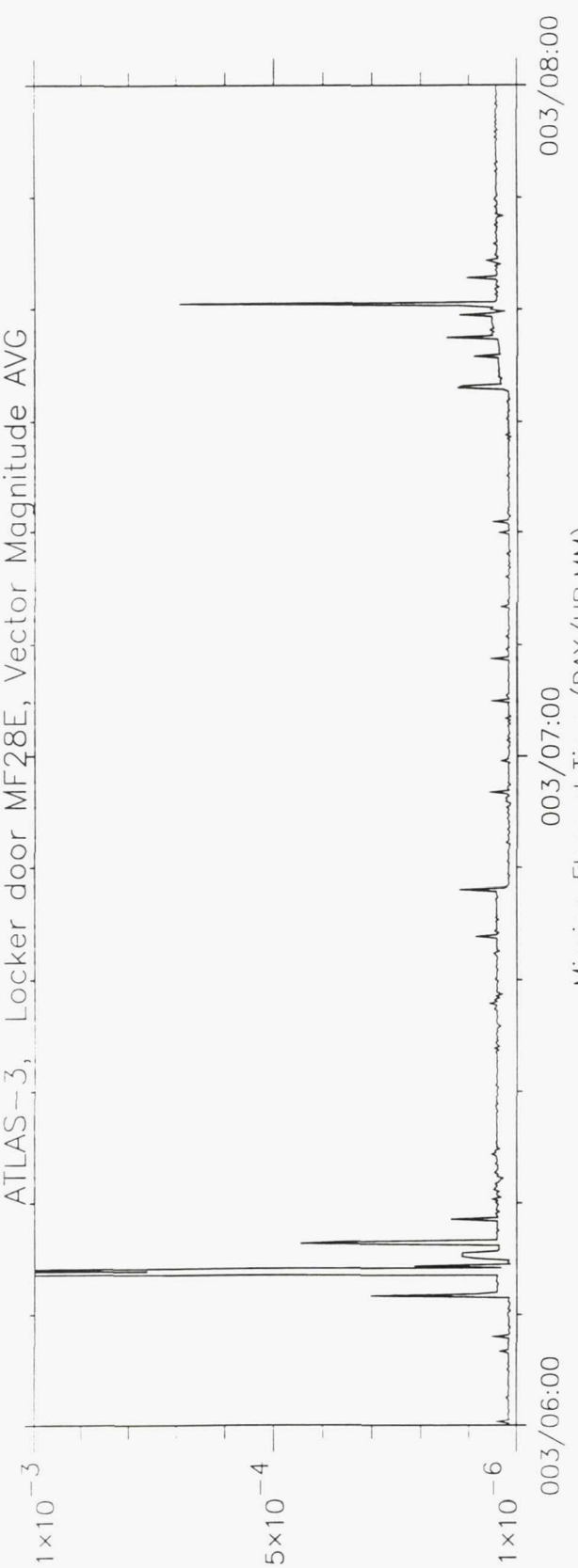
003/06:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
003/04:00
003/05:00
003/06:00
Mission Elapsed Time (DAY/HR:MM)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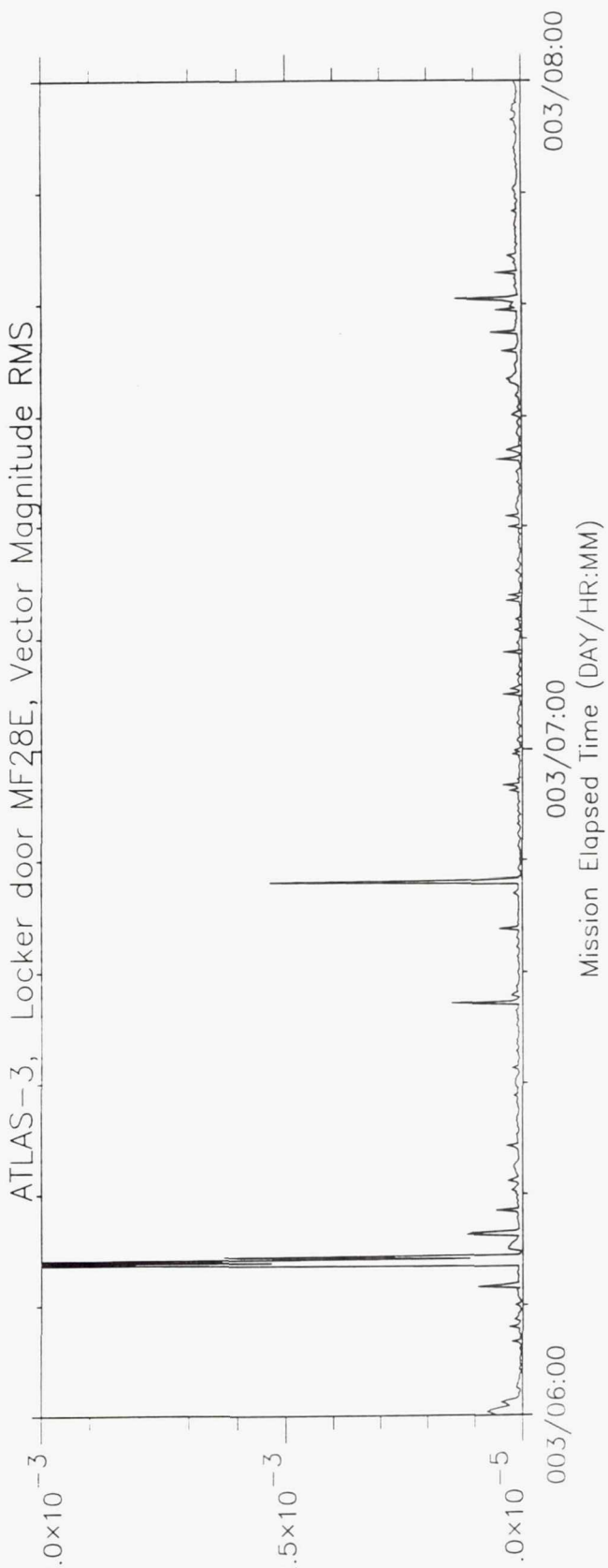
Acceleration(g)
003/06:00
003/07:00
003/08:00
Mission Elapsed Time (DAY/HR:MM)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Acceleration(g)
003/06:00
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003/08:00
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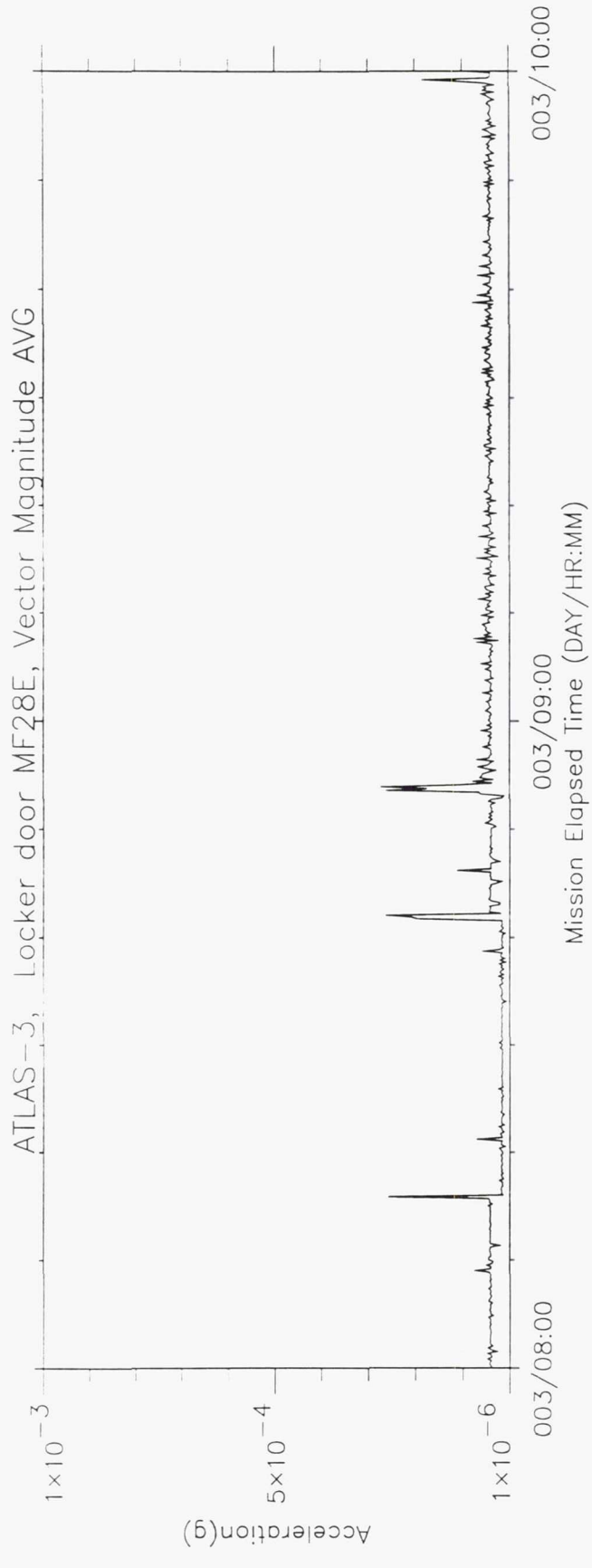
ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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Acceleration(g)
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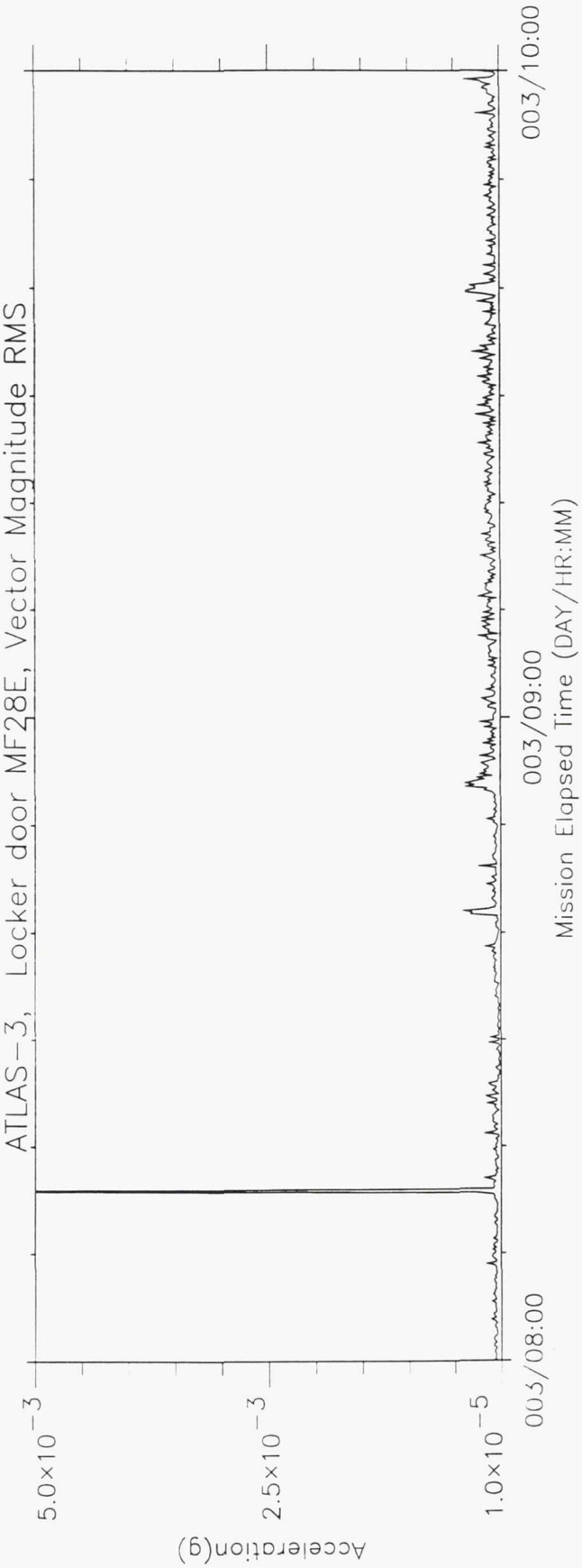
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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Acceleration(g)
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003/10:00
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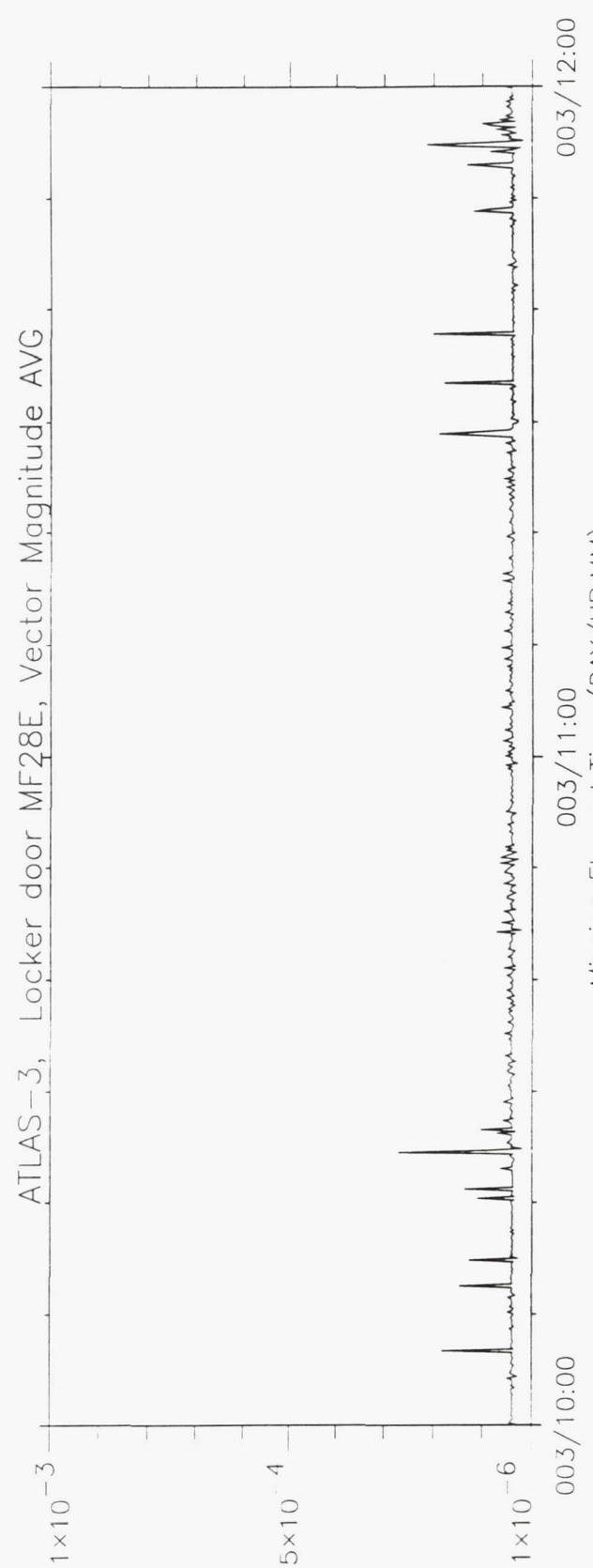
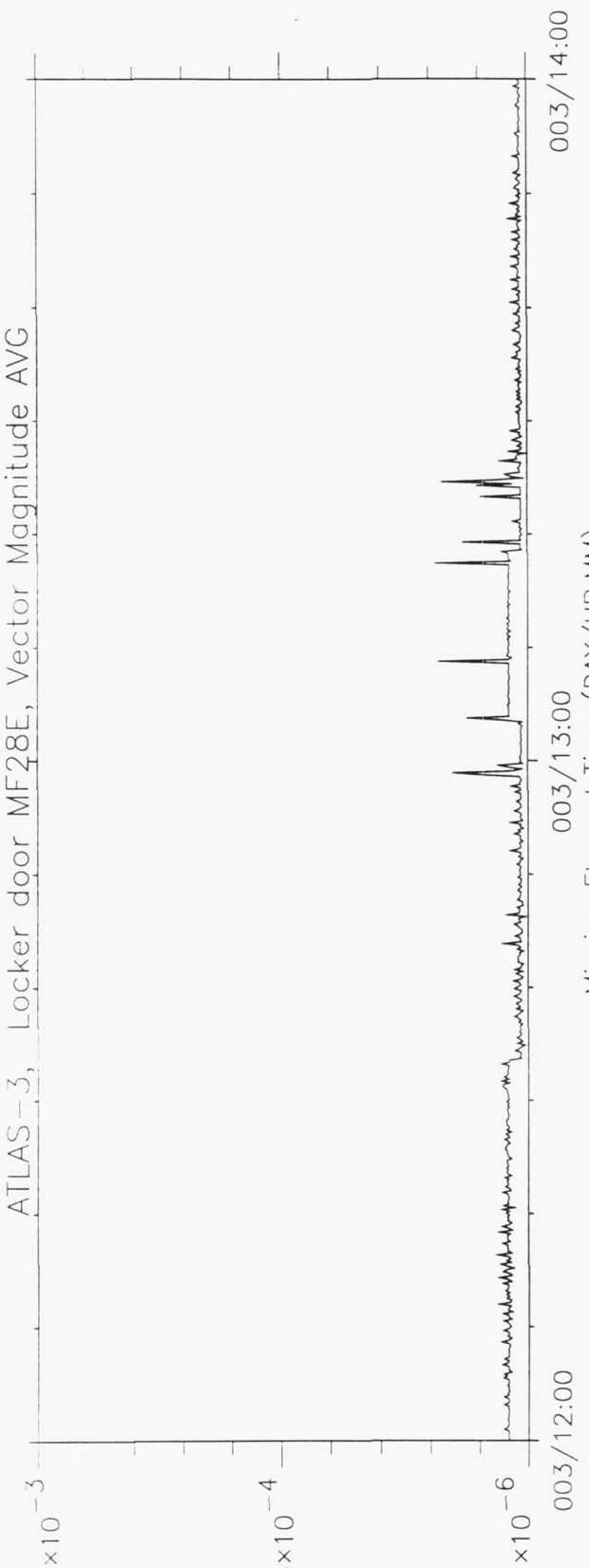

ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
1×10⁻³
5×10⁻⁴
1×10⁻⁶
003/10:00
003/11:00
003/12:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
003/10:00
003/11:00
003/12:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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Acceleration(g)
003/12:00
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003/14:00
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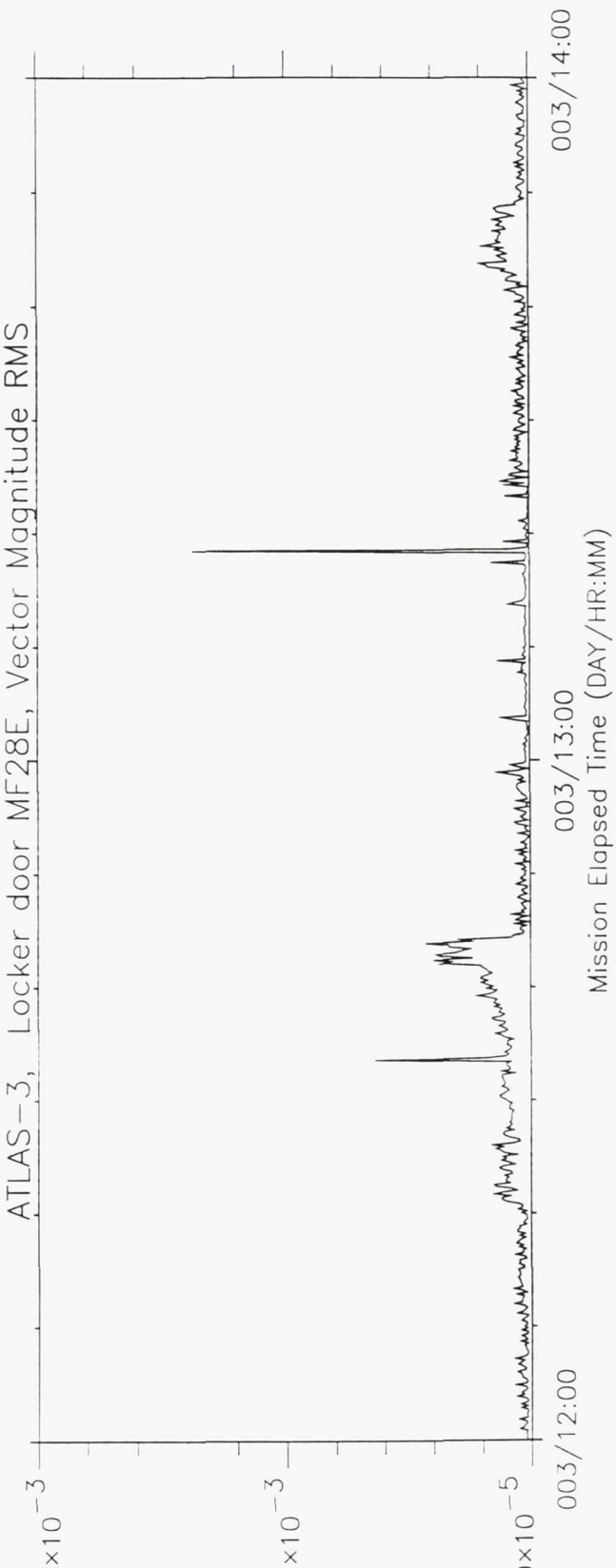
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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Acceleration(g)
003/12:00
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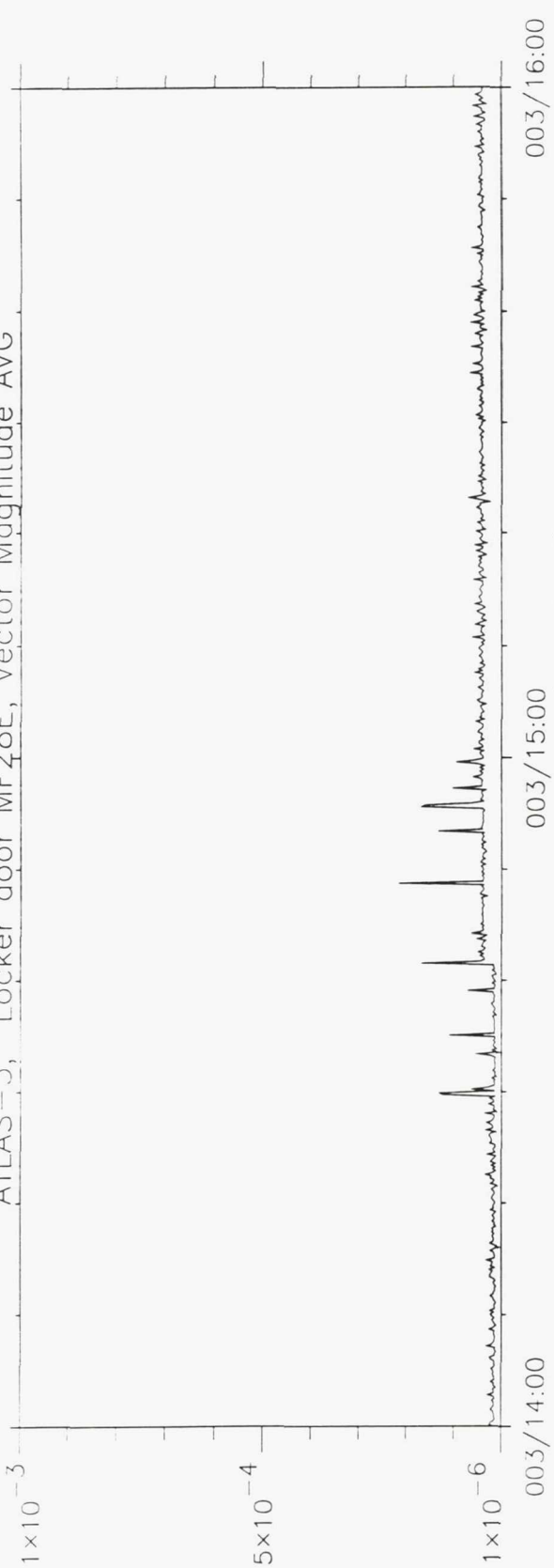
003/14:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
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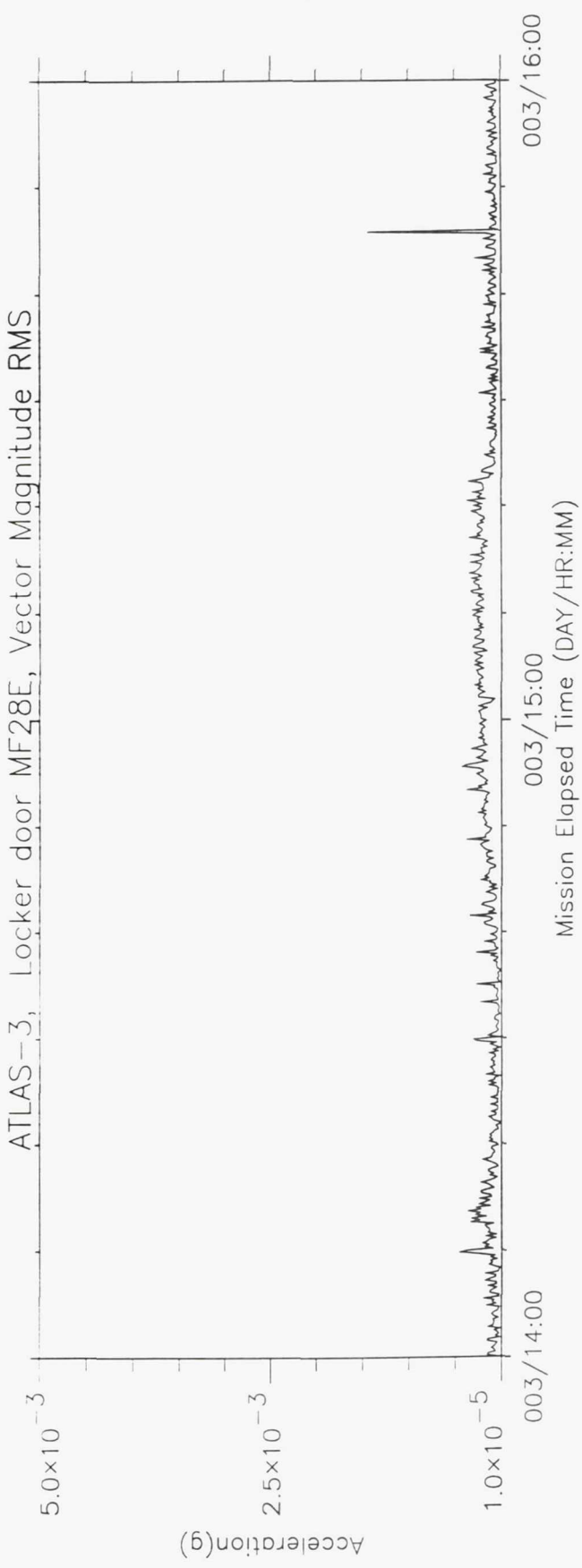
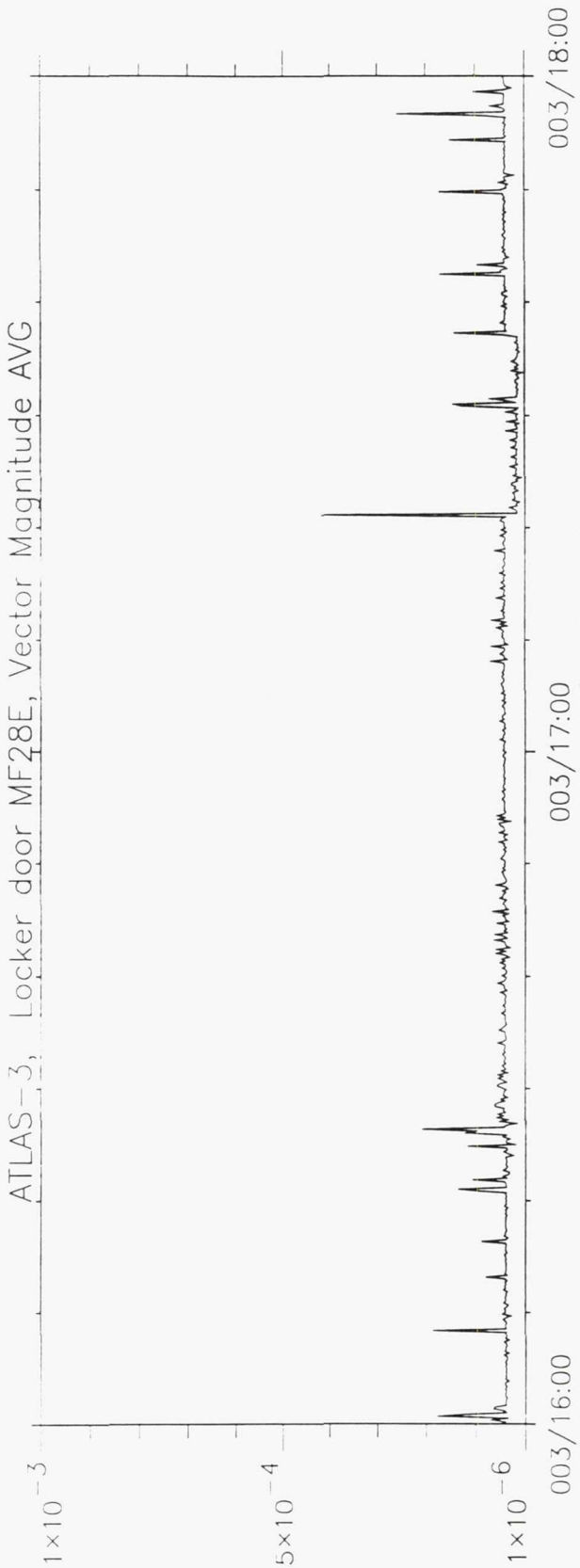
5×10^-4
1×10^-6
003/14:00
003/15:00
003/16:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10^-3
2.5×10^-3
1.0×10^-5
003/14:00
003/15:00
003/16:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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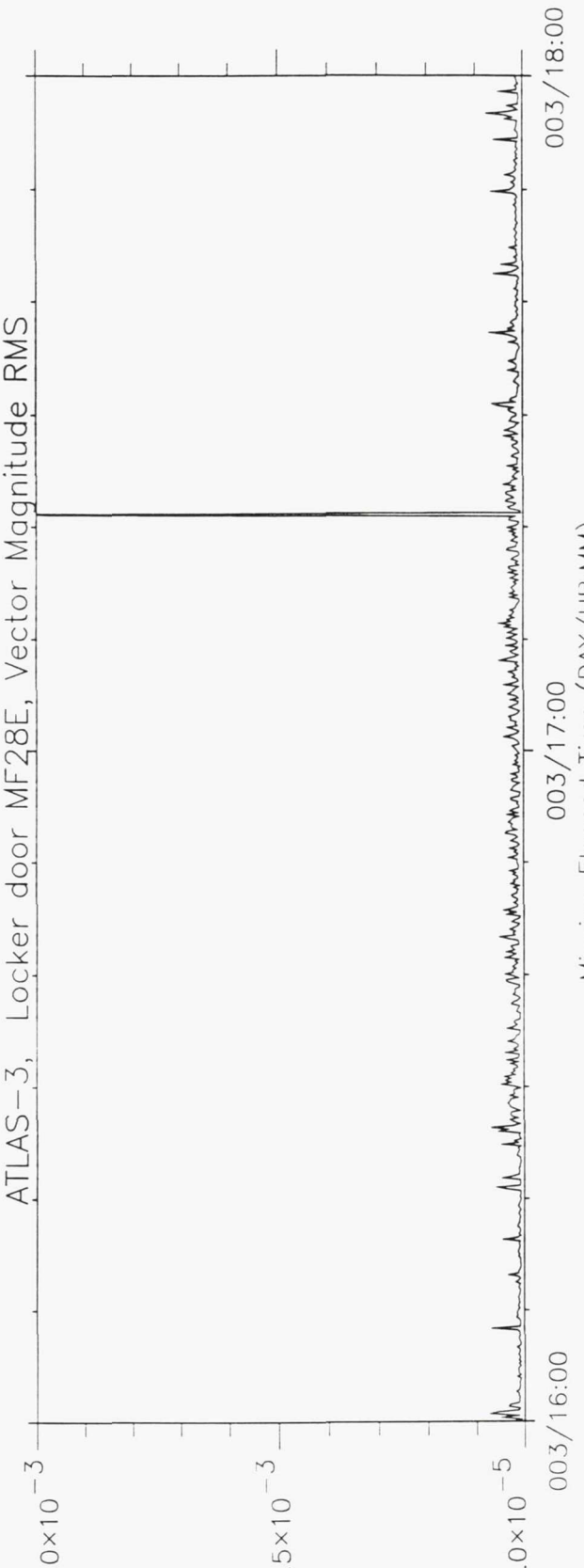
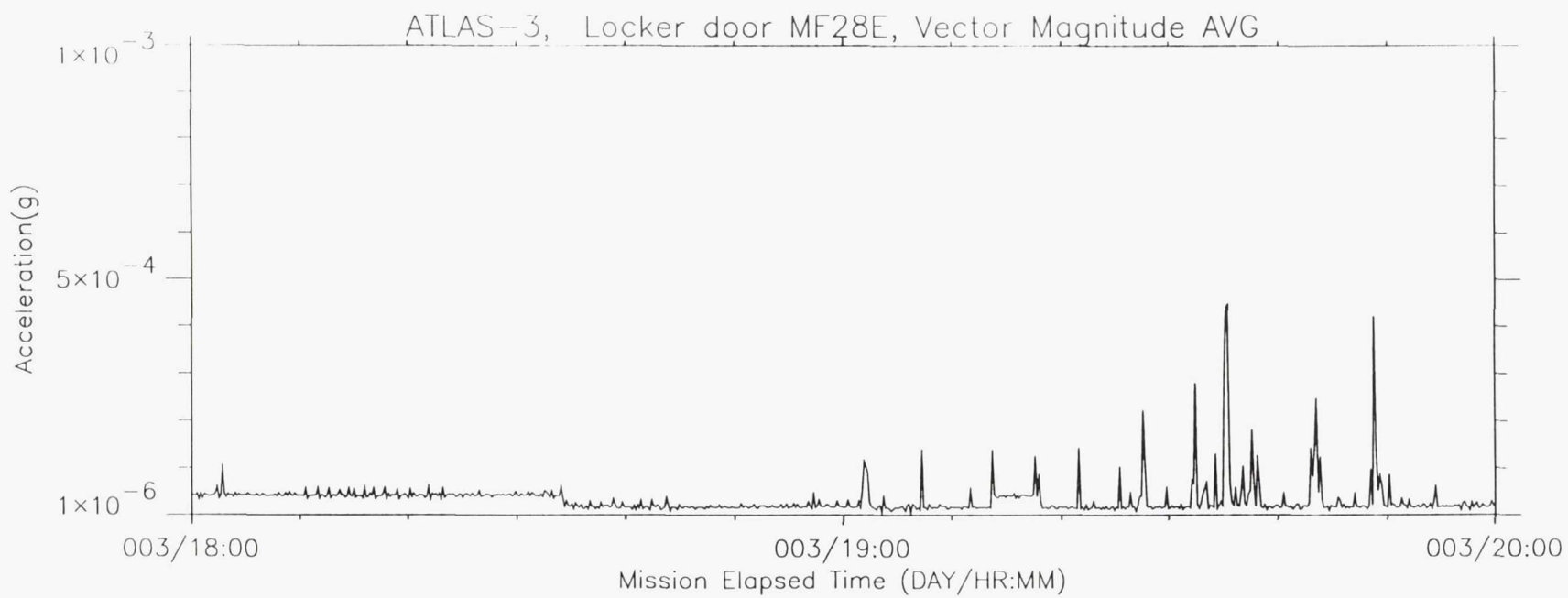
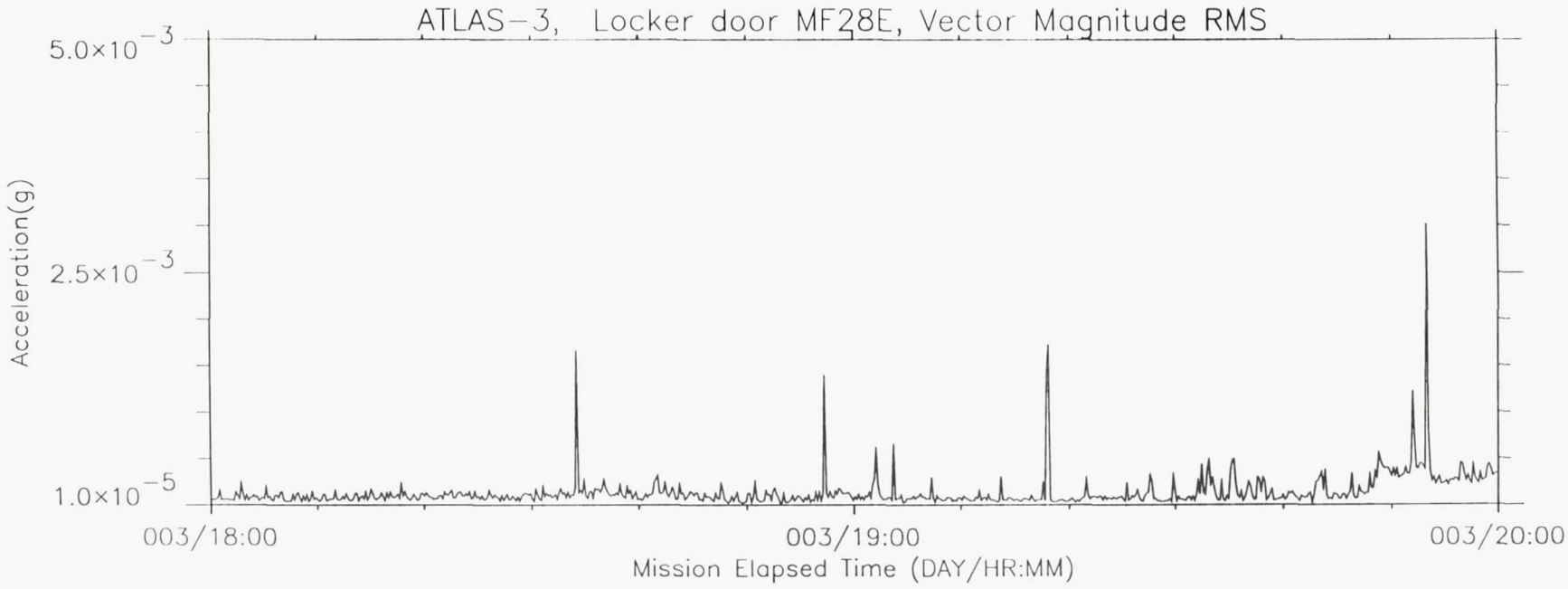
1×10^-6
Acceleration(g)
003/16:00
003/17:00
003/18:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
2.5×10^-3
1.0×10^-5
Acceleration(g)
003/16:00
003/17:00
003/18:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS−3, Locker door MF28E, Vector Magnitude AVG
1×10−3
5×10−4
1×10−6
Acceleration(g)
003/18:00
003/19:00
003/20:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS−3, Locker door MF28E, Vector Magnitude RMS
5.0×10−3
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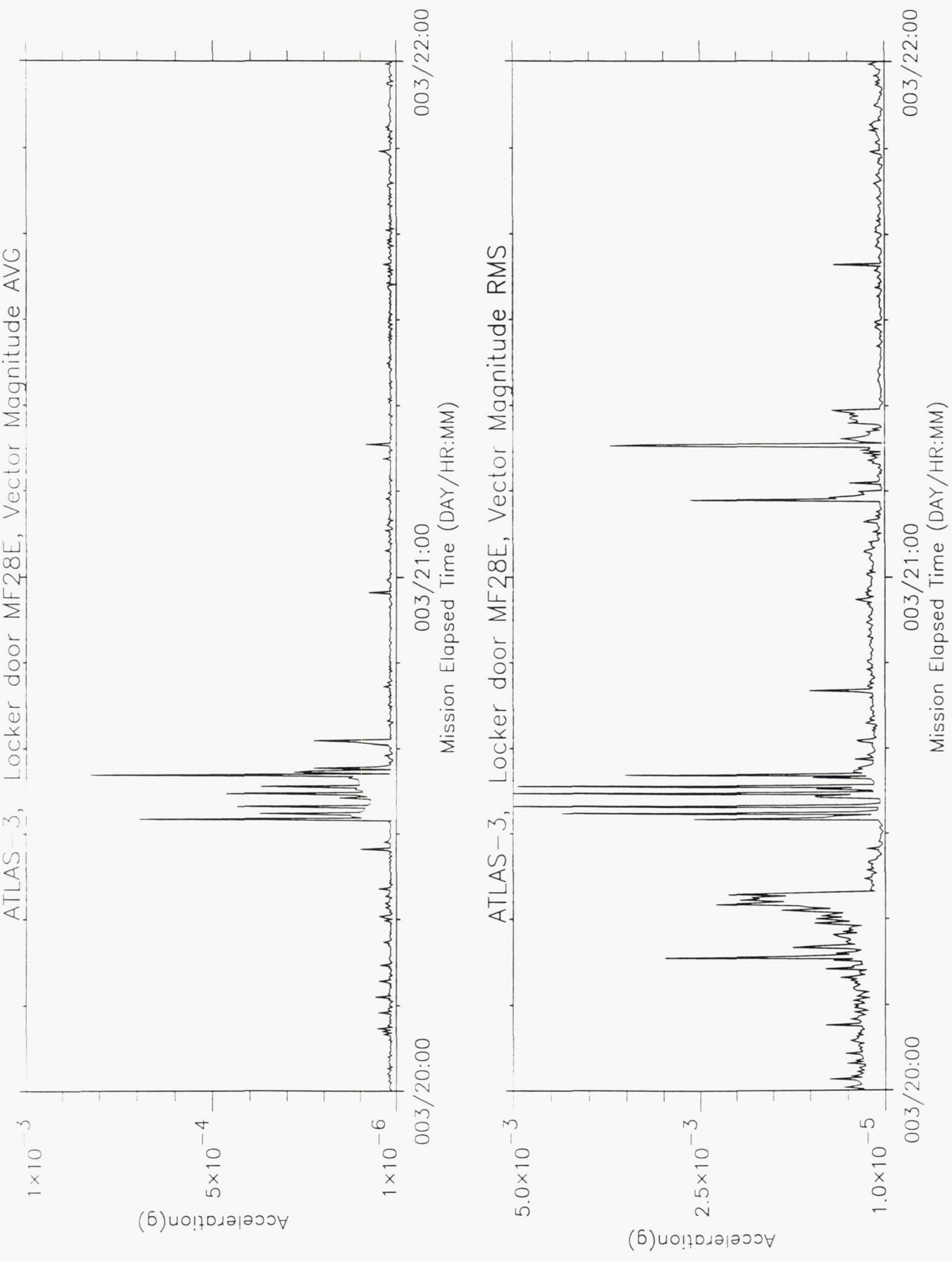
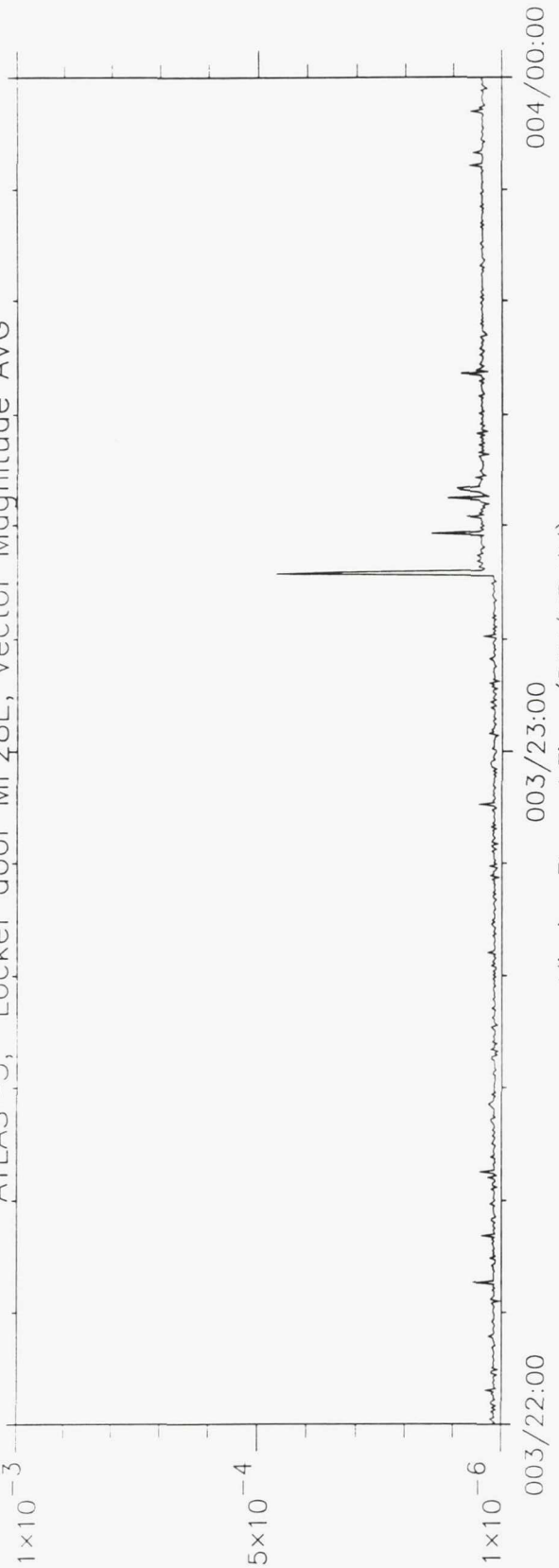
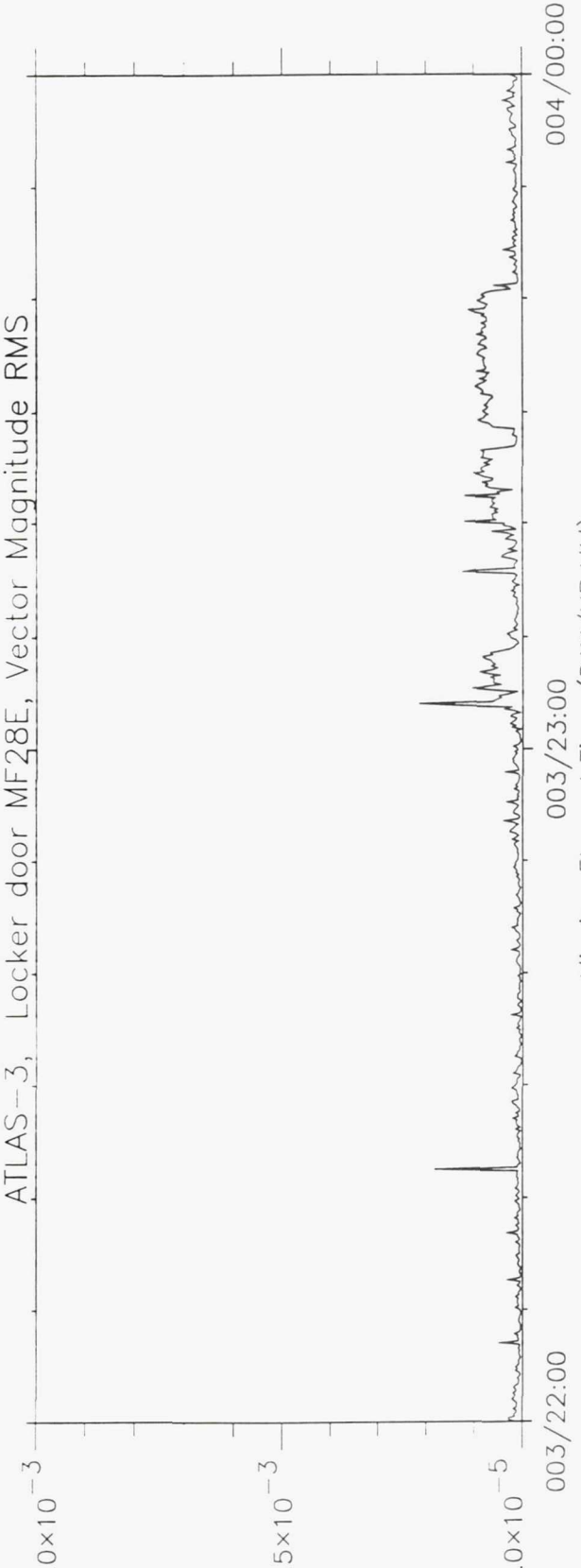
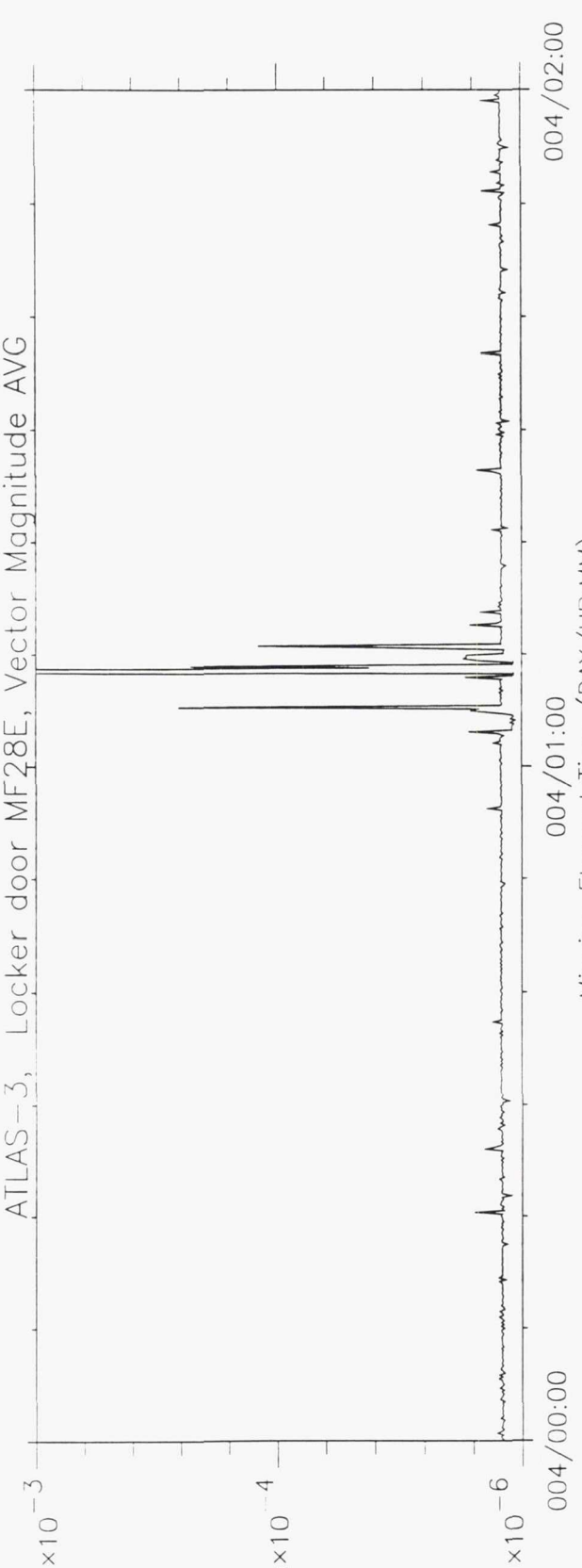
1.0×10−5
Acceleration(g)
003/18:00
003/19:00
003/20:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10^-3
5×10^-4
1×10^-6
Acceleration(g)
003/20:00
003/21:00
003/22:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
2.5×10^-3
1.0×10^-5
Acceleration(g)
003/20:00
003/21:00
003/22:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
1×10⁻³
5×10⁻⁴
1×10⁻⁶
003/22:00
003/23:00
004/00:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
003/22:00
003/23:00
004/00:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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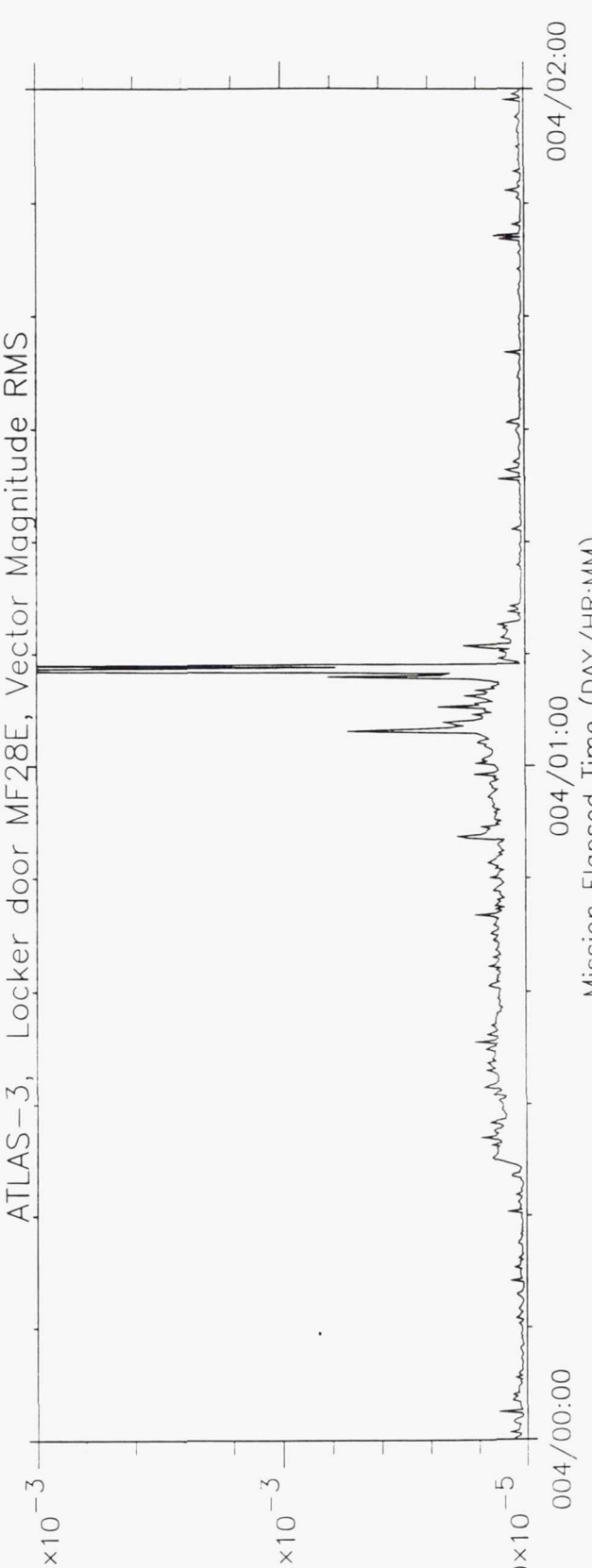
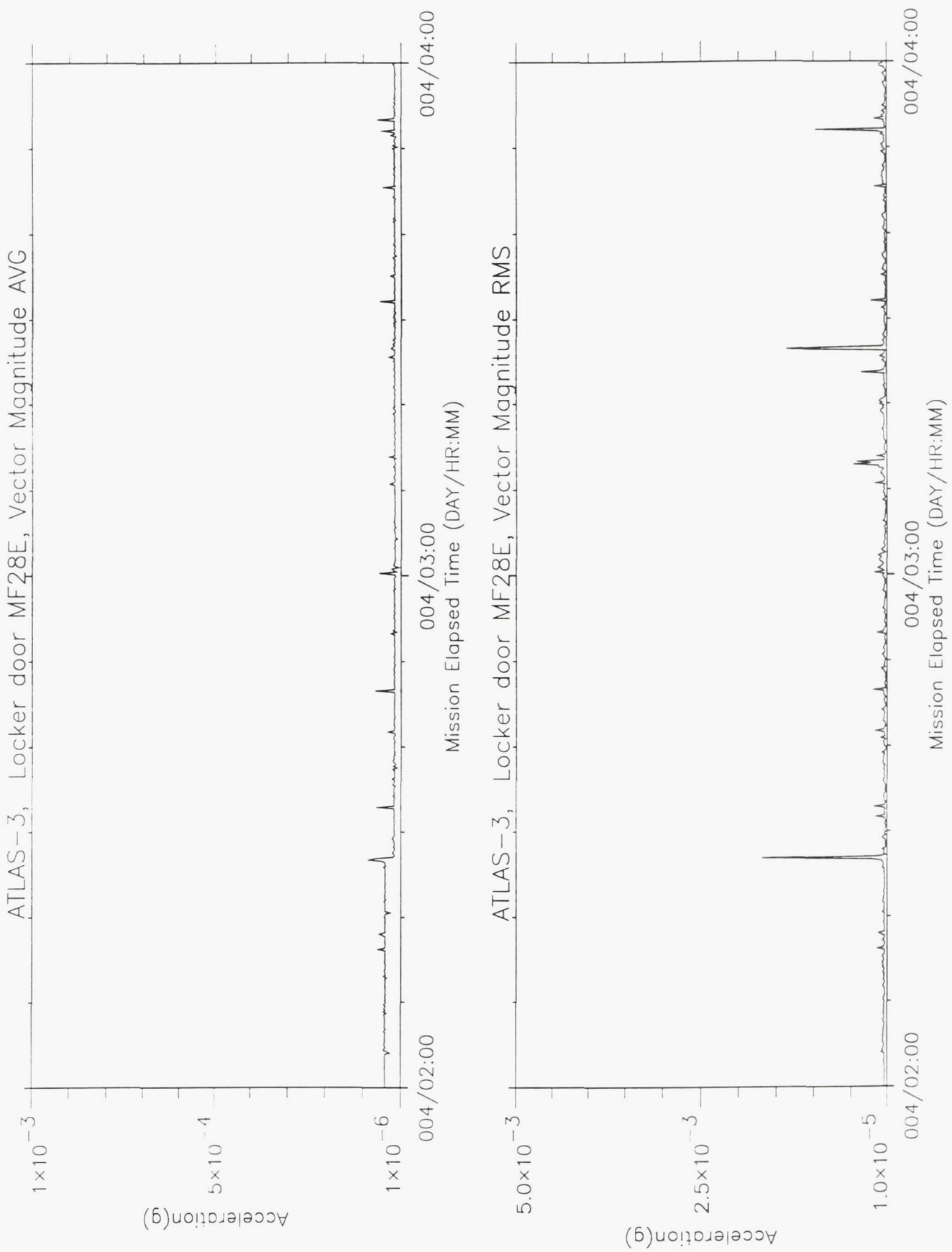
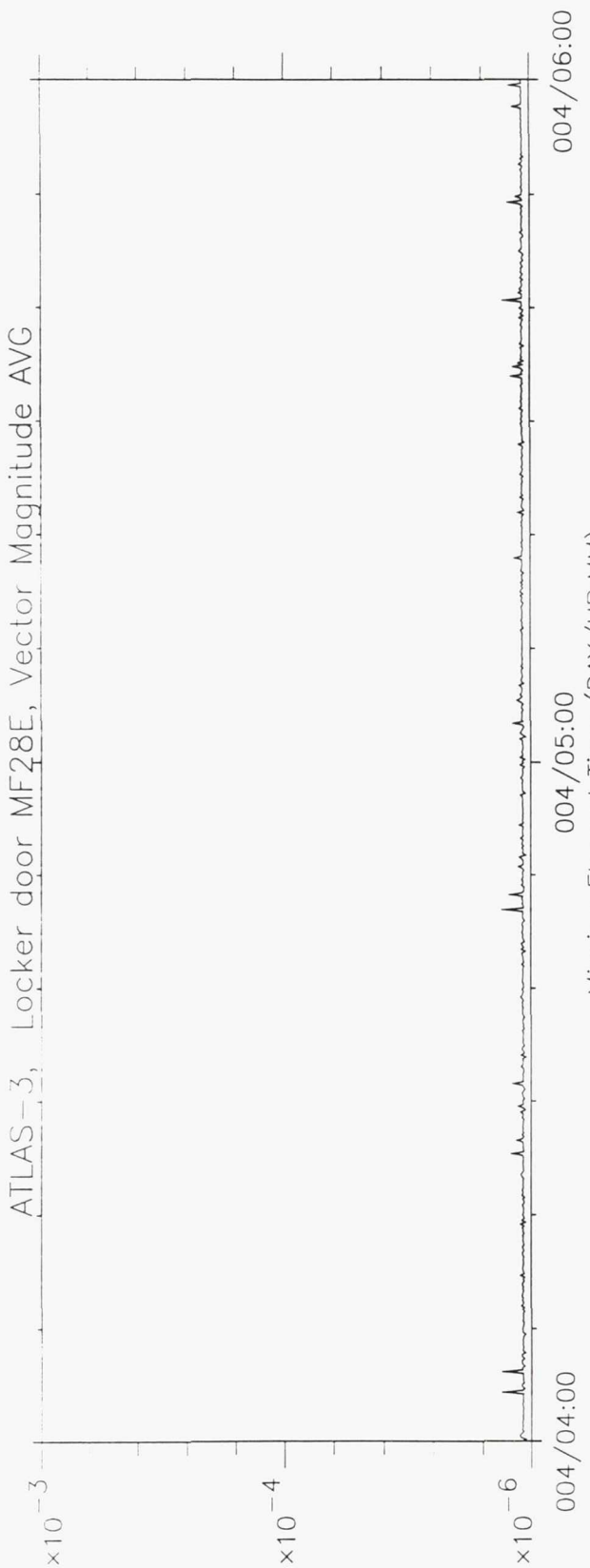
5×10^-4
1×10^-6
Acceleration(g)
004/00:00
004/01:00
004/02:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
2.5×10^-3
1.0×10^-5
Acceleration(g)
004/00:00
004/01:00
004/02:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
1×10⁻³
5×10⁻⁴
1×10⁻⁶
004/02:00
004/03:00
004/04:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
004/02:00
004/03:00
004/04:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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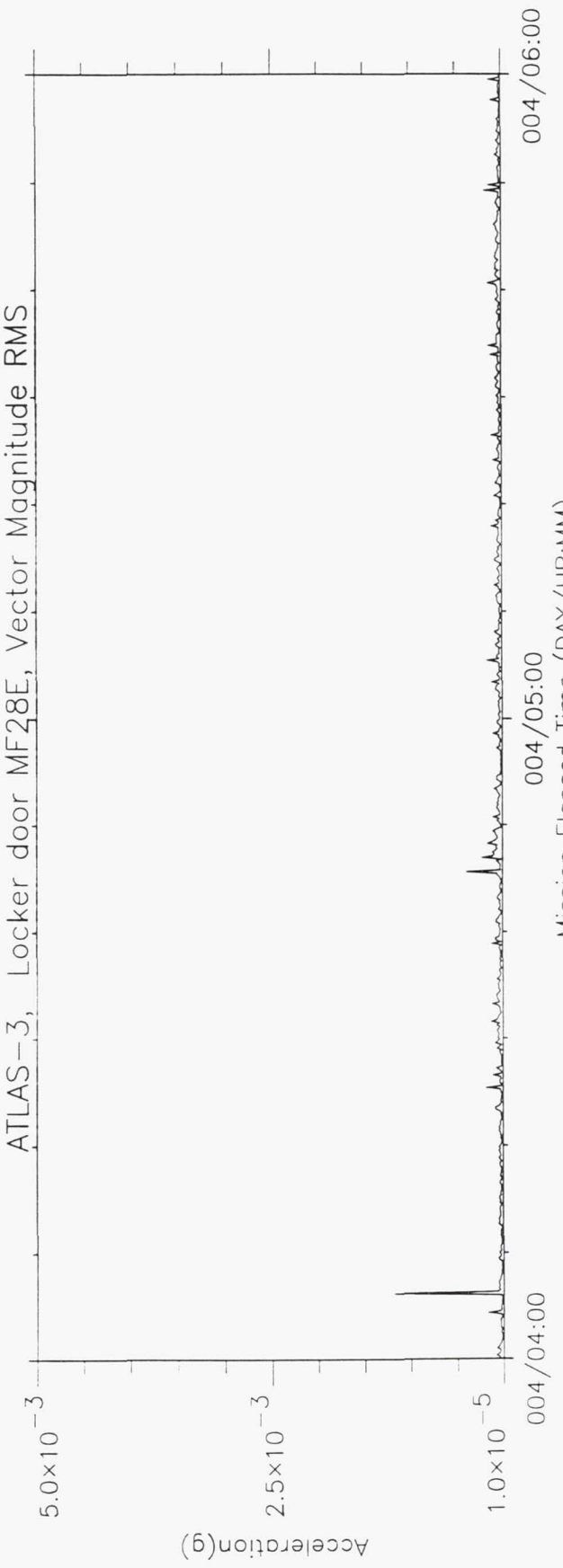
5×10^-4
1×10^-6
Acceleration(g)
004/04:00
004/05:00
004/06:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
2.5×10^-3
1.0×10^-5
Acceleration(g)
004/04:00
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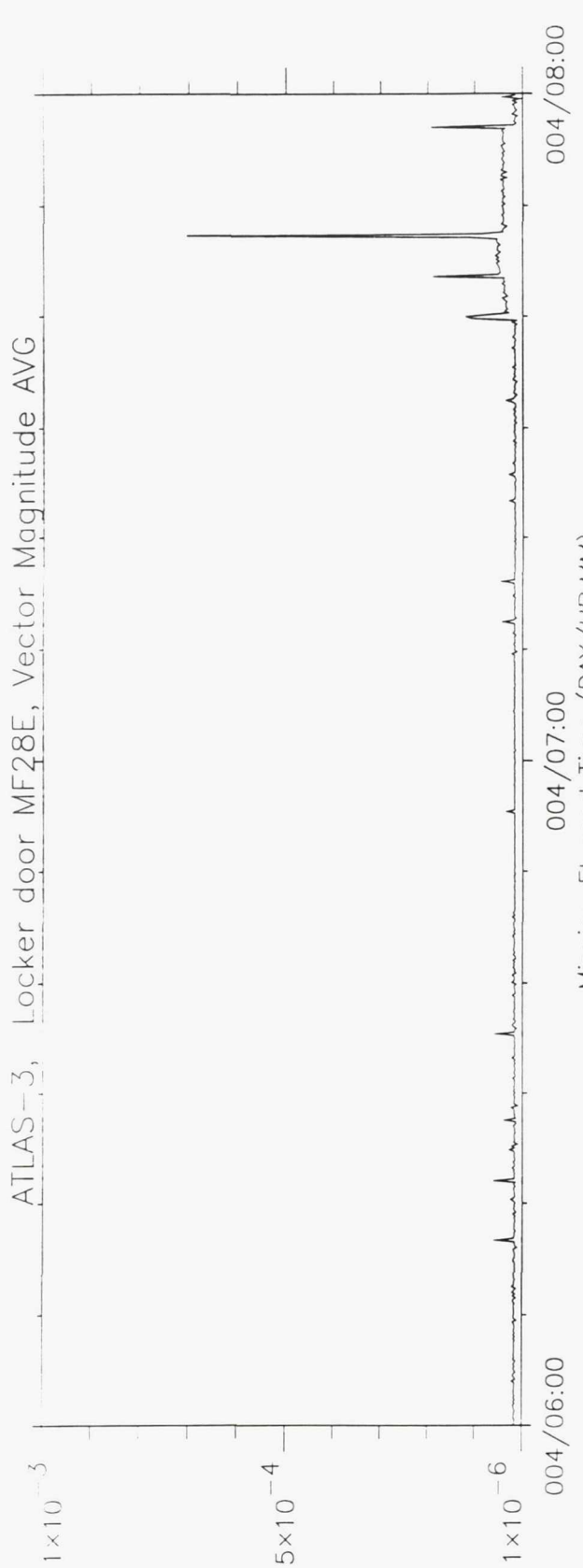
004/06:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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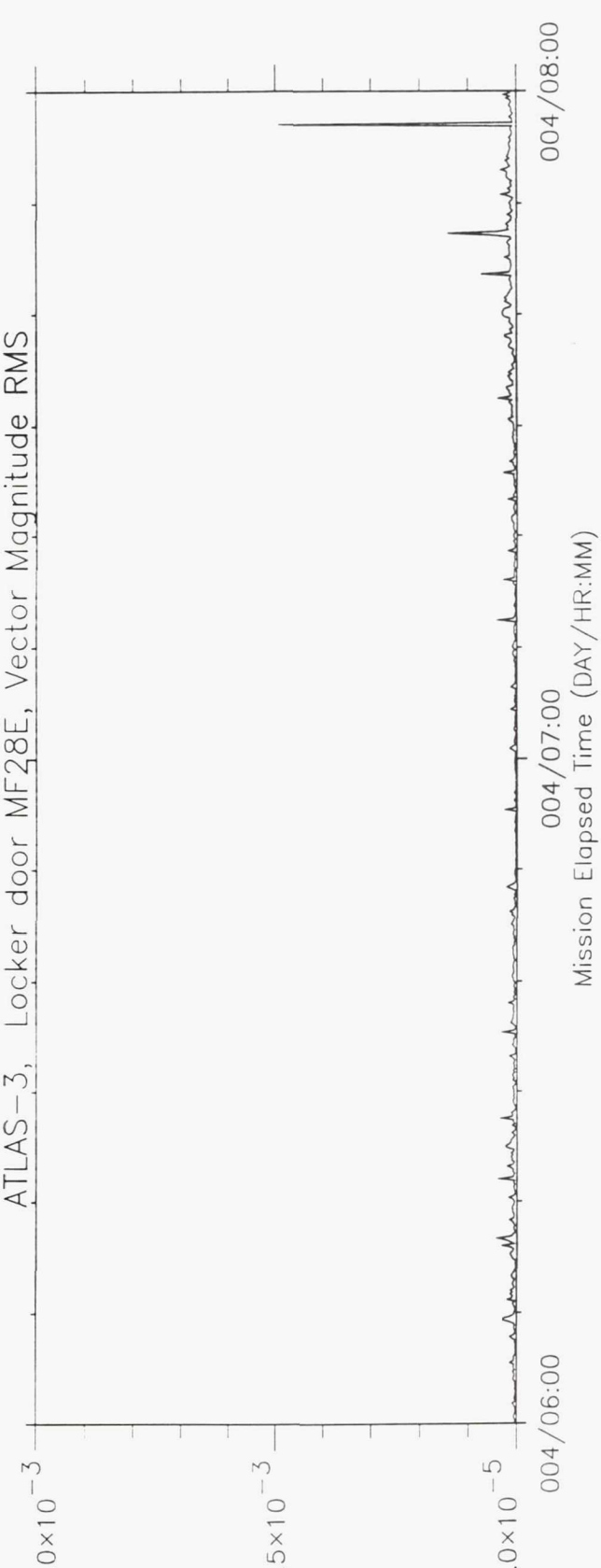
5×10^-4
1×10^-6
Acceleration(g)
004/06:00
004/07:00
004/08:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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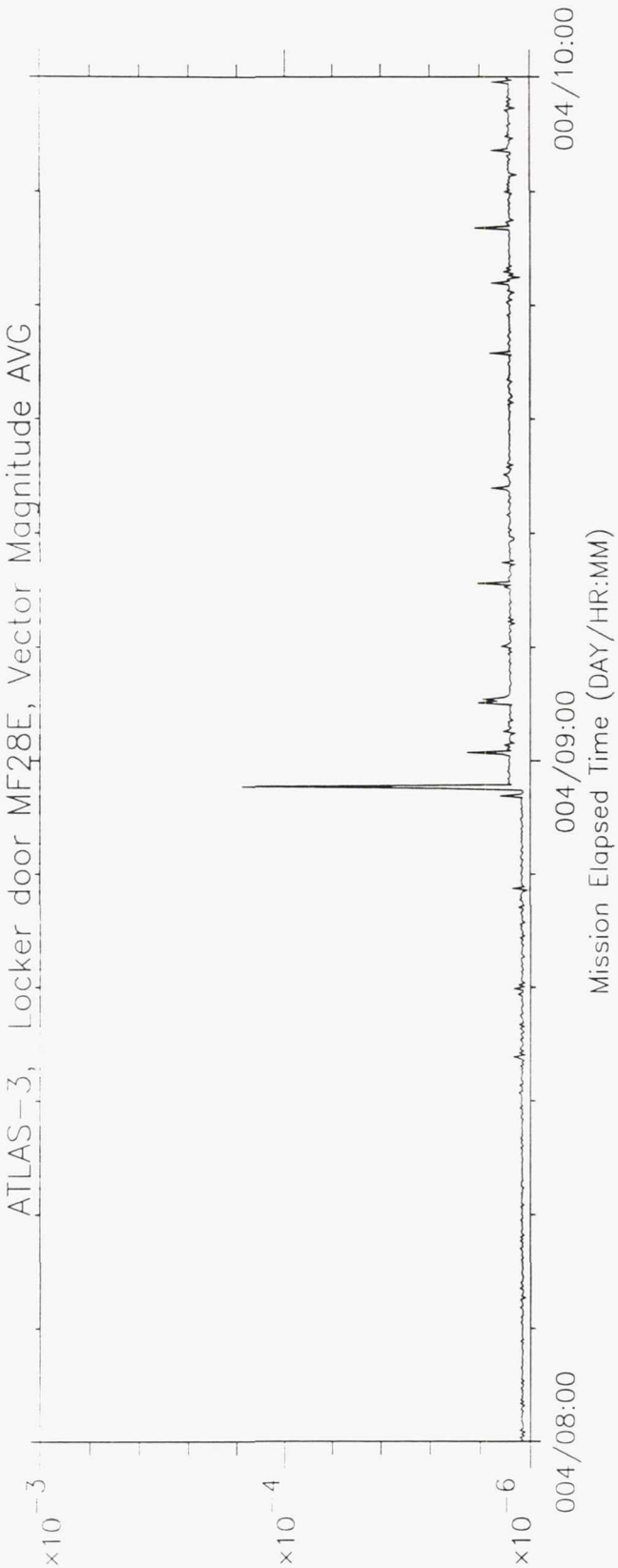
Acceleration(g)
004/06:00
004/07:00
004/08:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10⁻³
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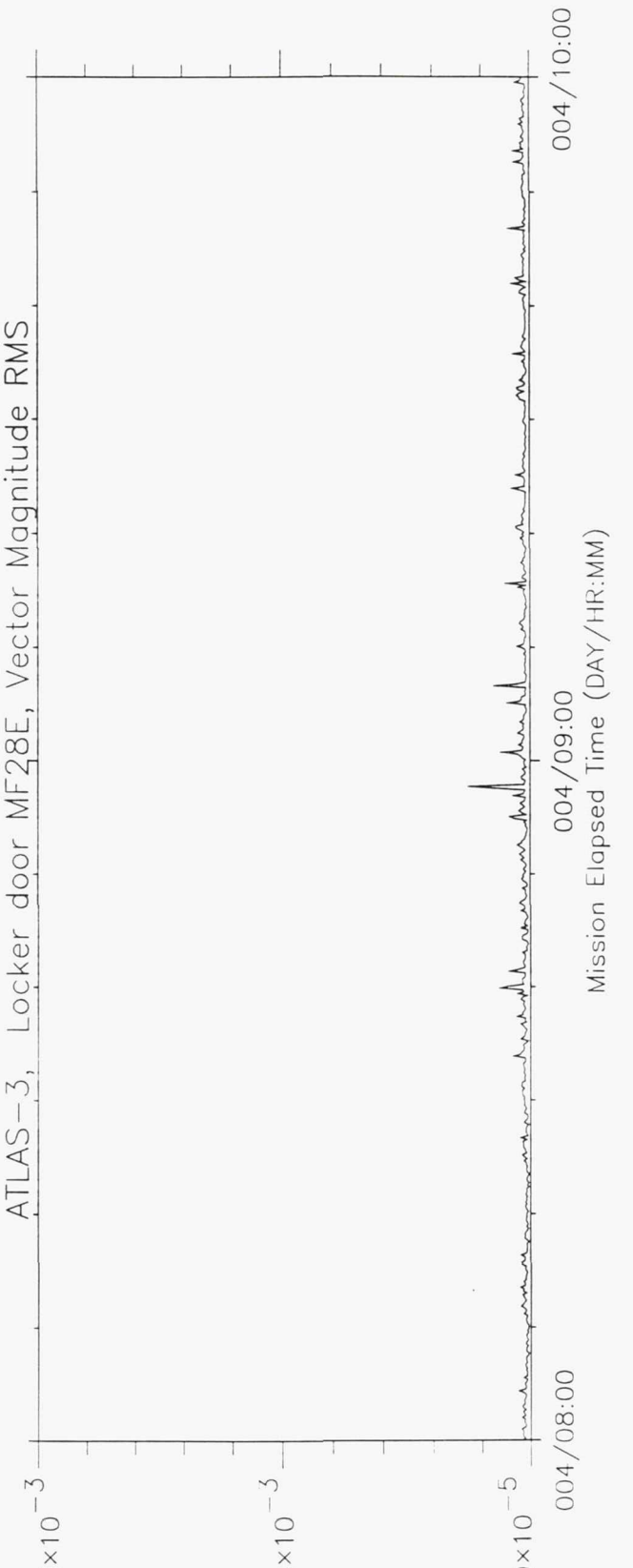
1×10⁻⁶
Acceleration(g)
004/08:00
004/09:00
004/10:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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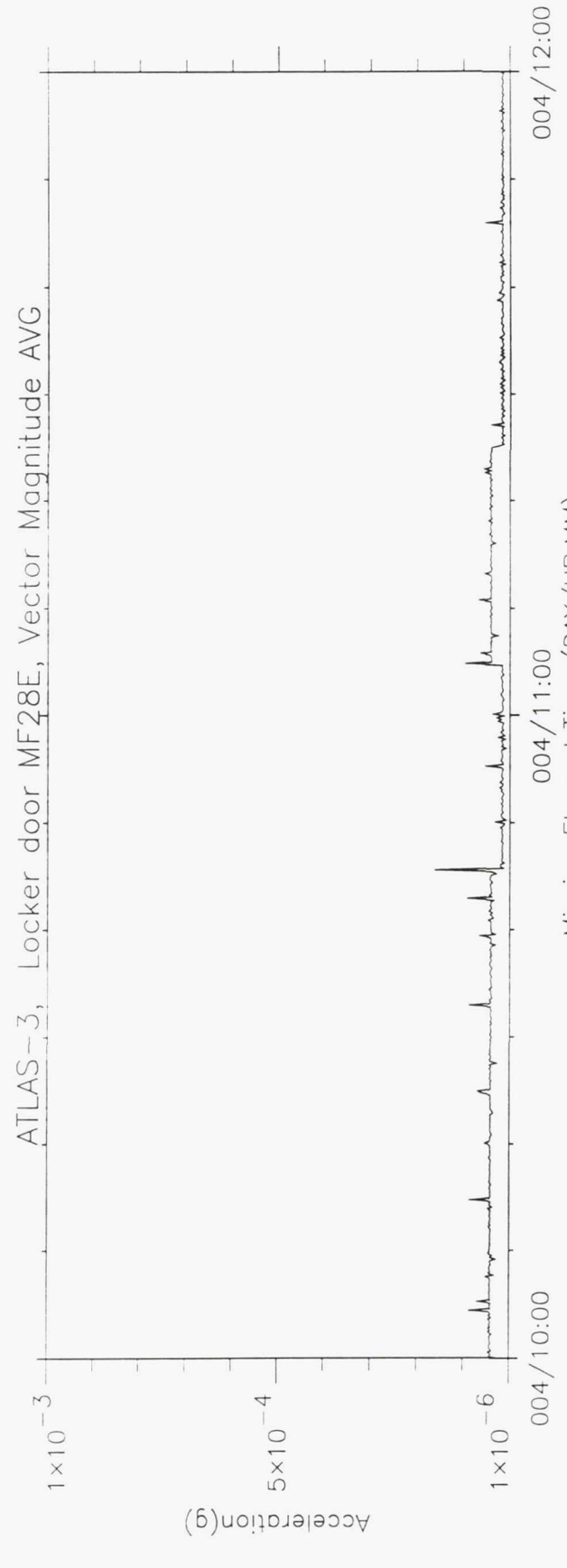
2.5×10⁻³
1.0×10⁻⁵
Acceleration(g)
004/08:00
004/09:00
004/10:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
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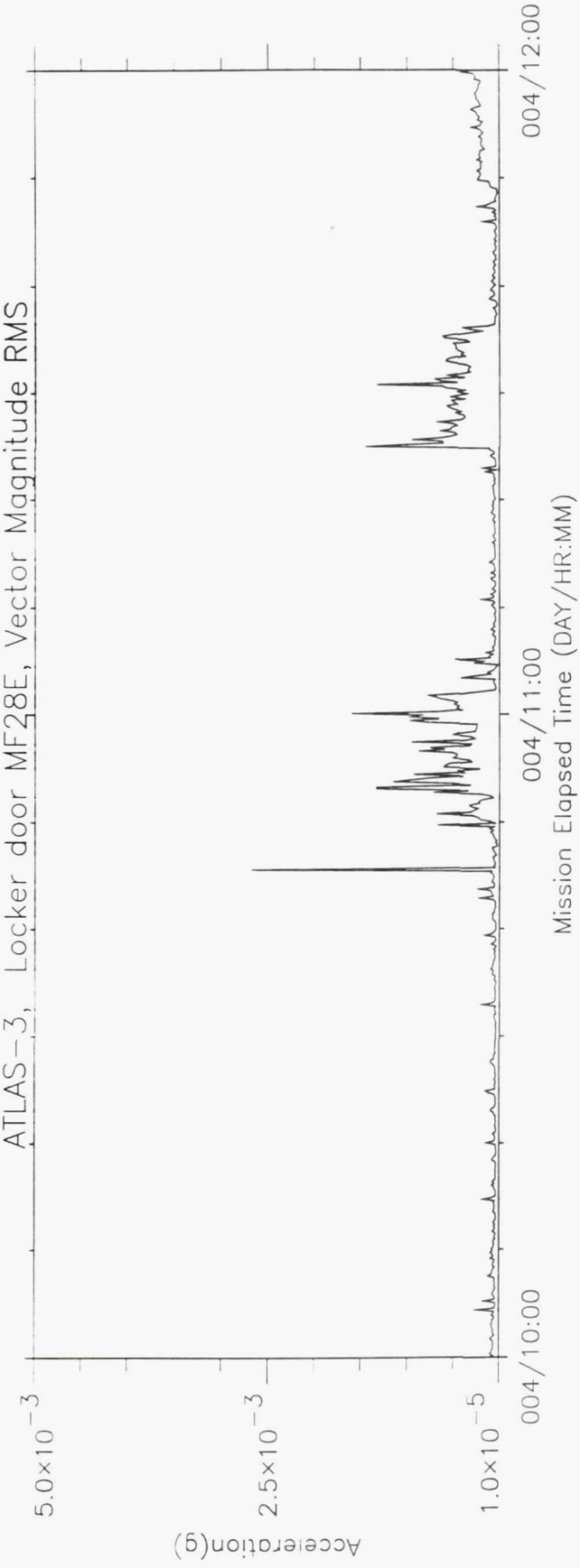
004/11:00
004/12:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
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1.0×10^-5
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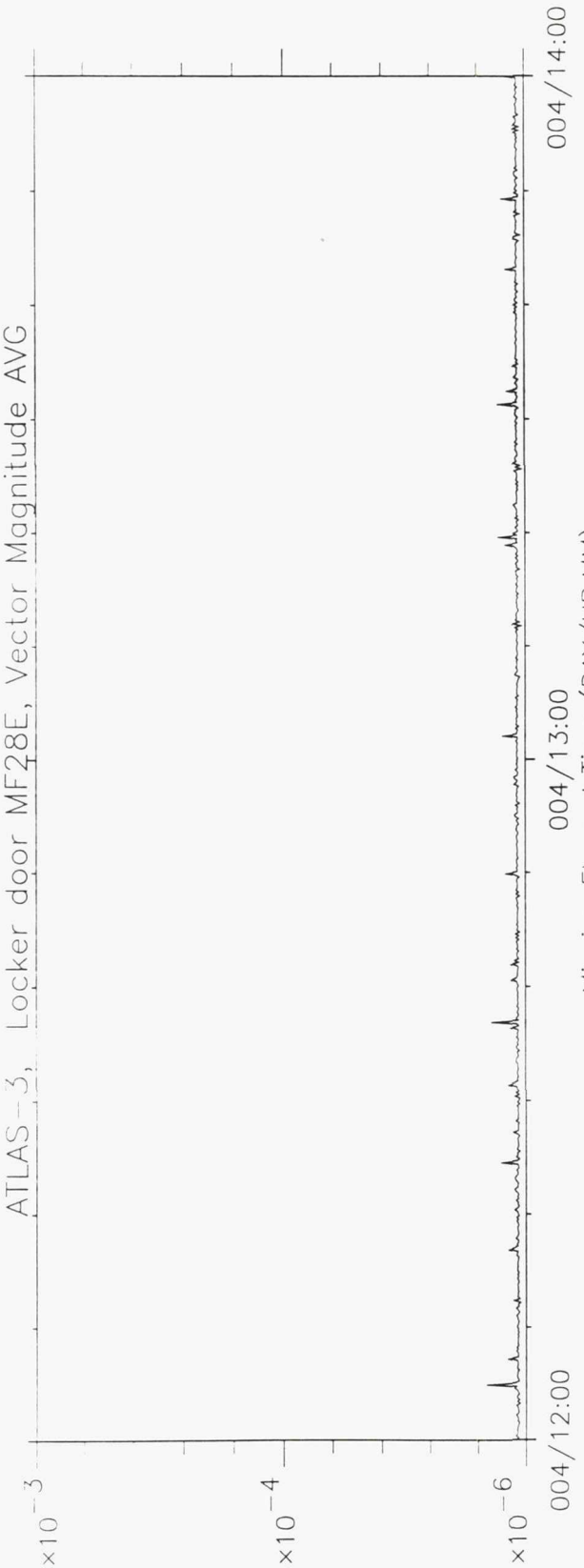
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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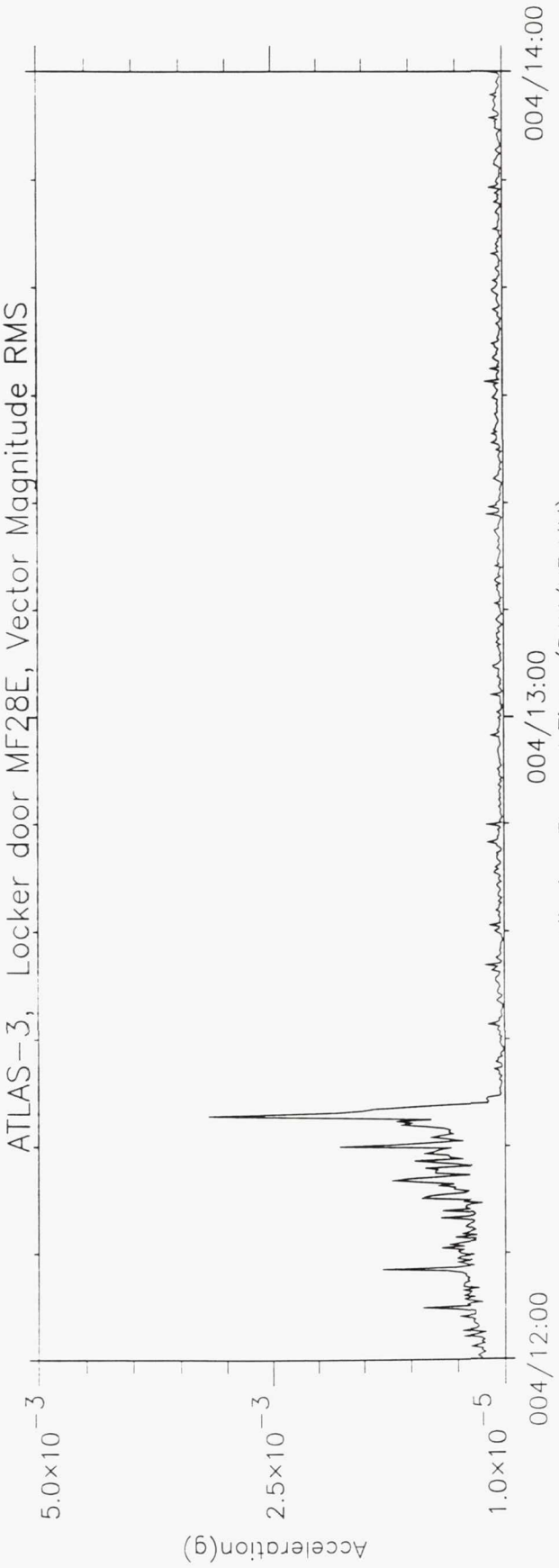
1×10^-6
Acceleration(g)
004/12:00
004/13:00
004/14:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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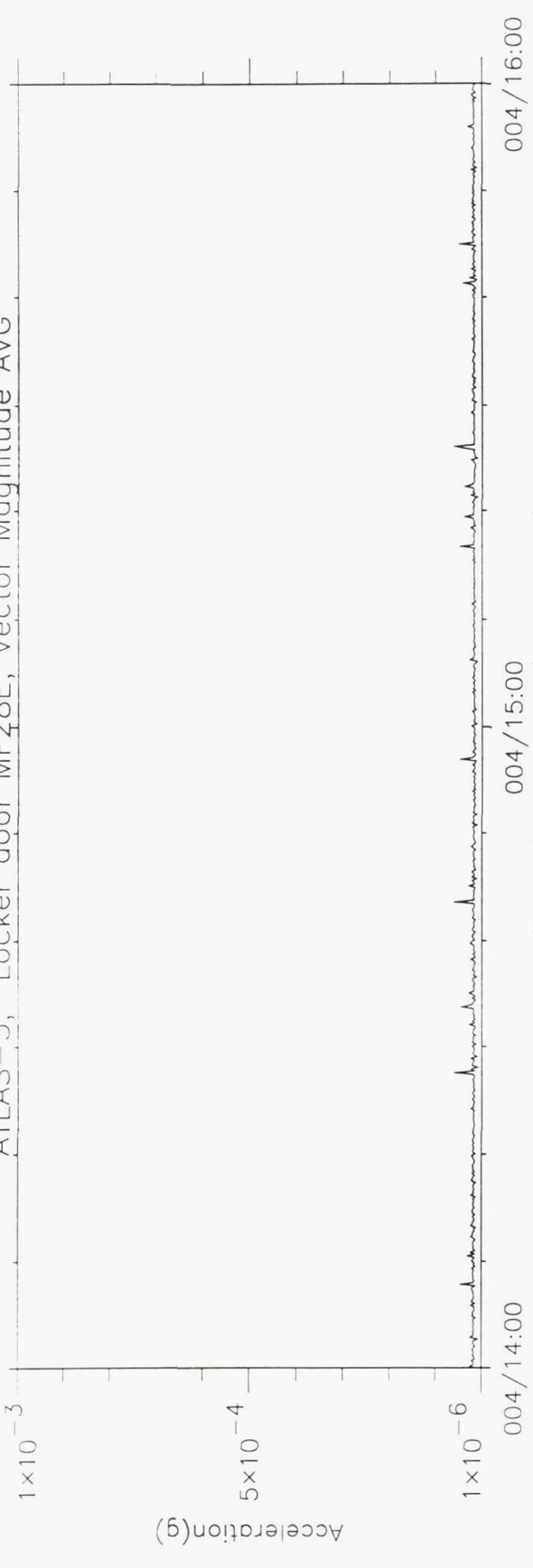
Acceleration(g)
004/12:00
004/13:00
004/14:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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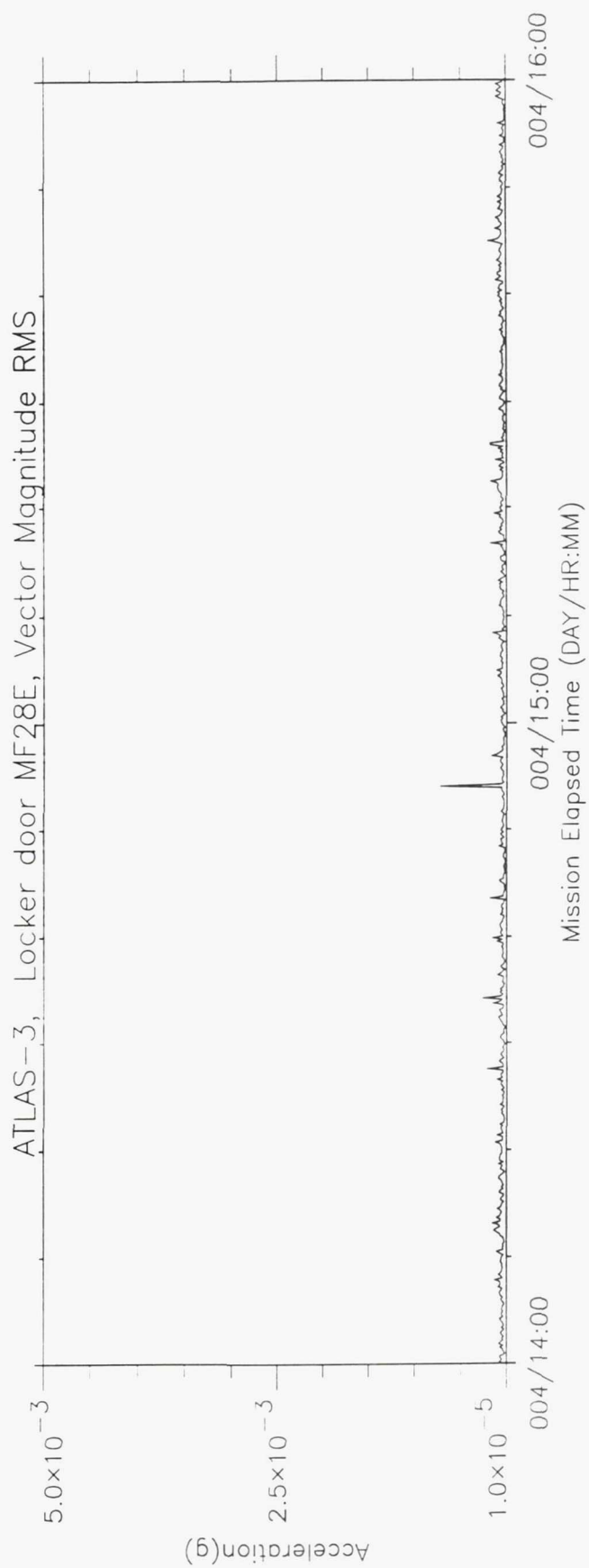
5×10^-4
1×10^-6
Acceleration(g)
004/14:00
004/15:00
004/16:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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Acceleration(g)
004/14:00
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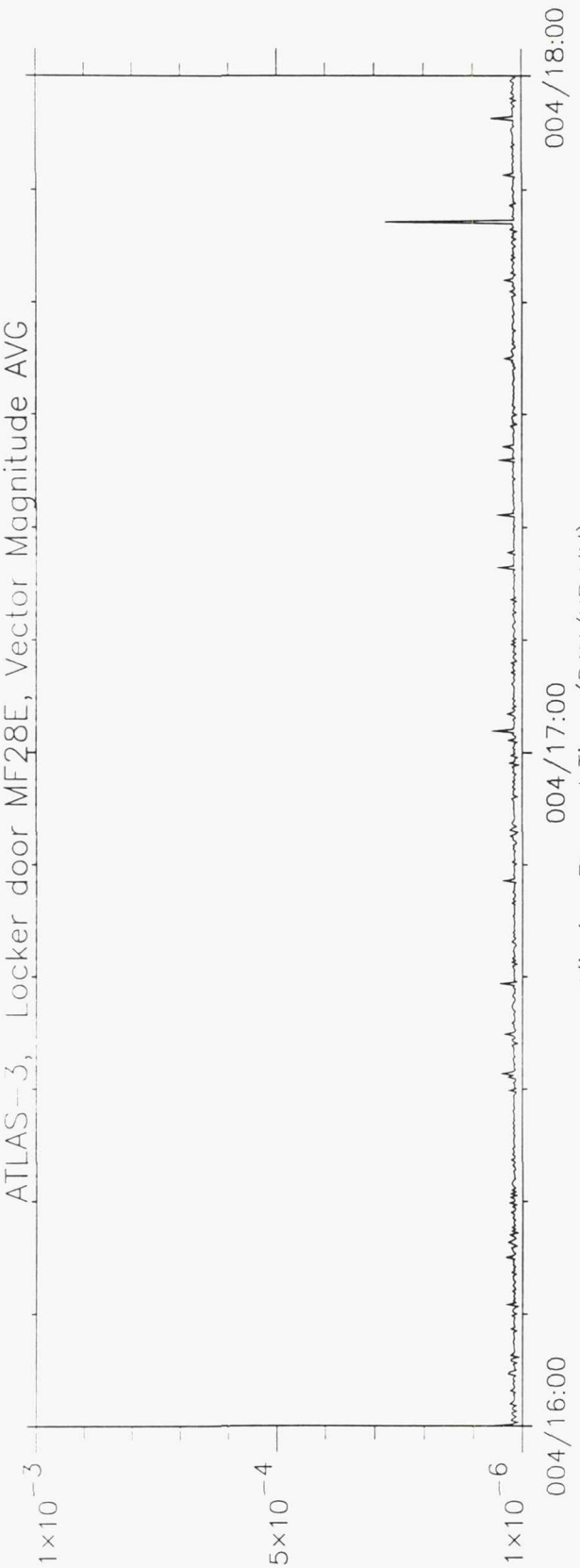
004/16:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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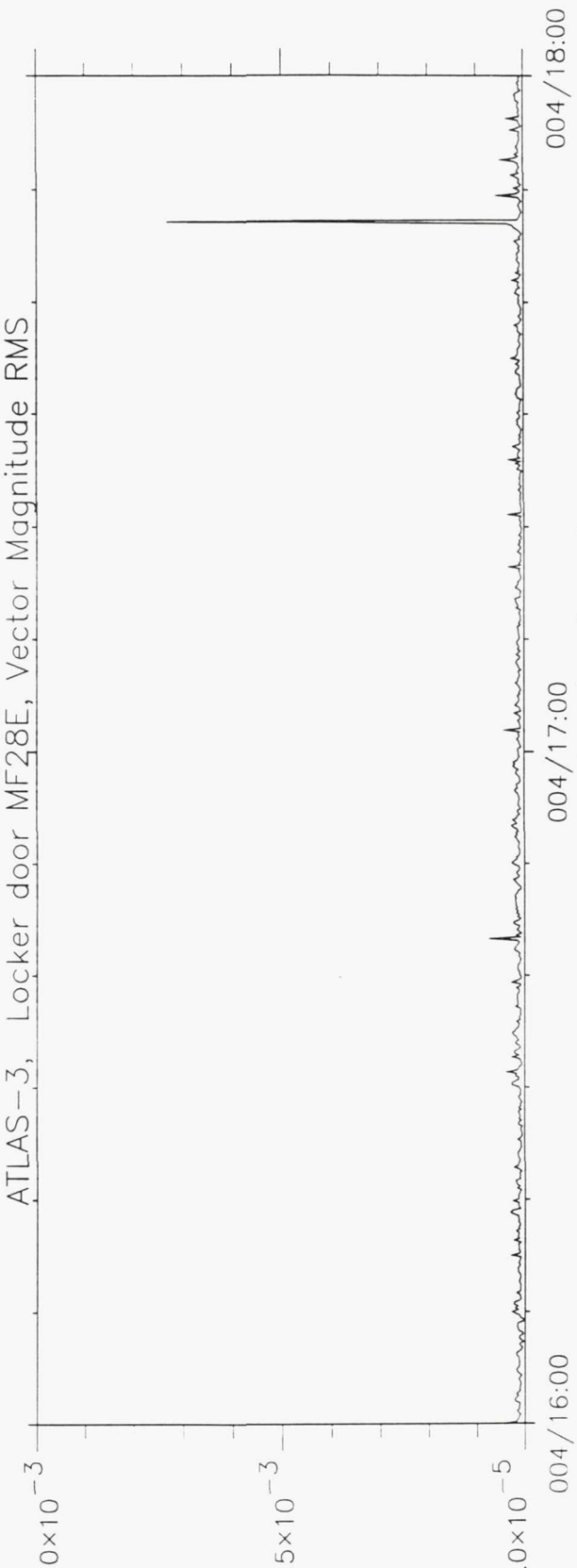
5×10^-4
1×10^-6
Acceleration(g)
004/16:00
004/17:00
004/18:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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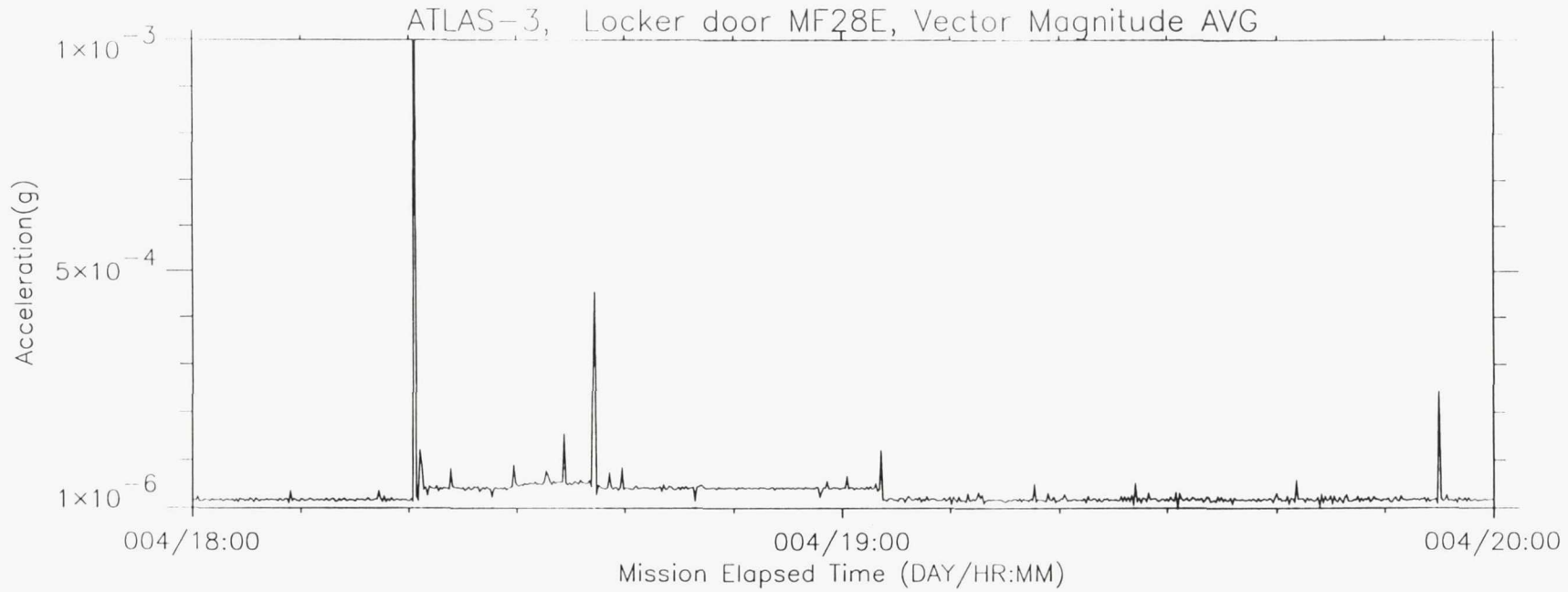
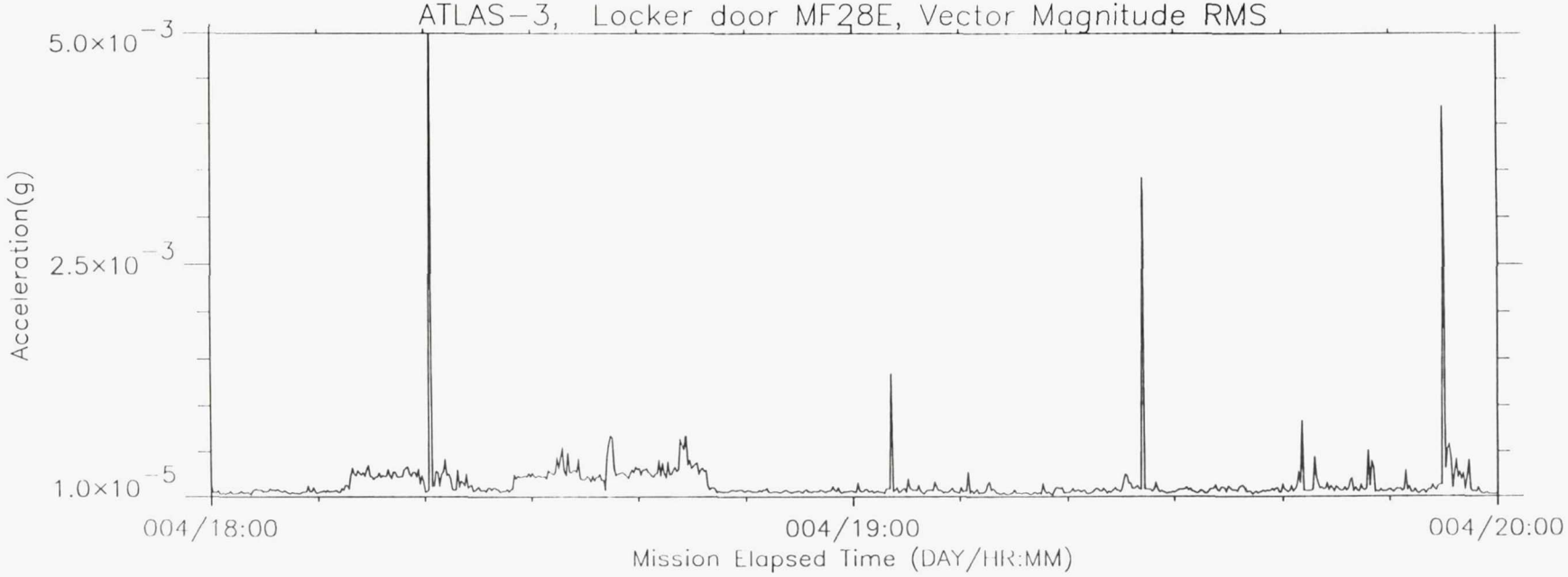
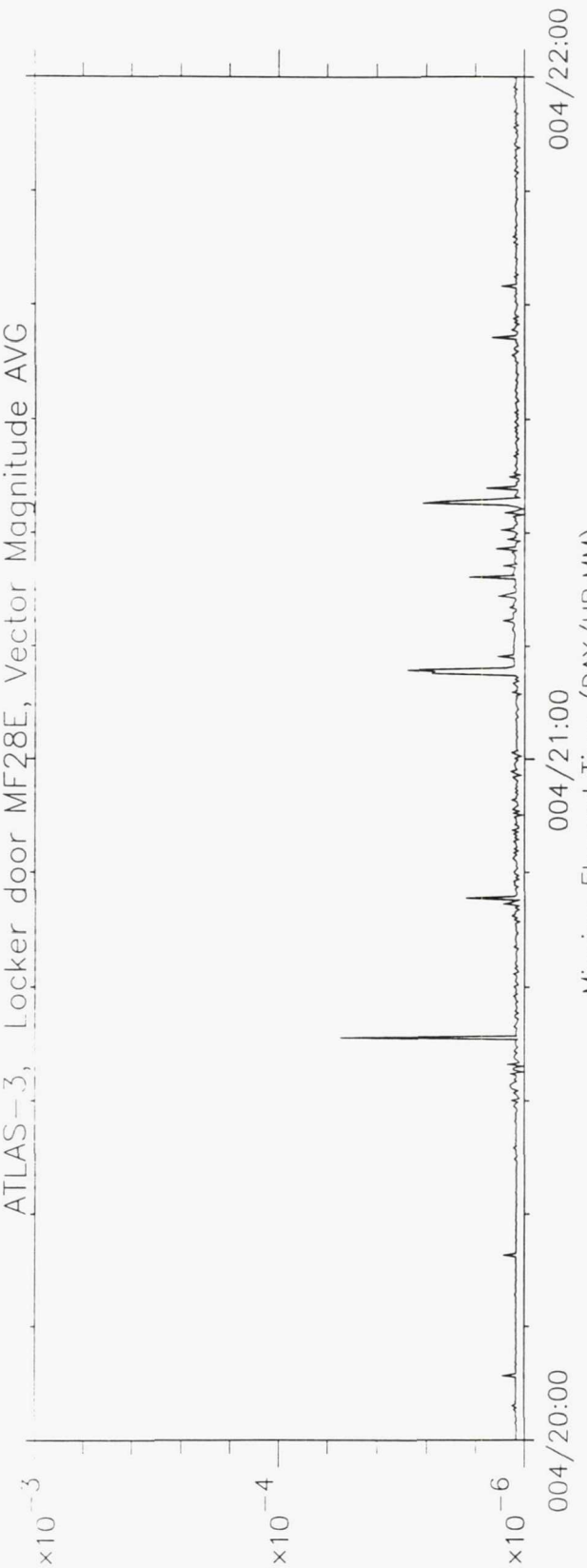
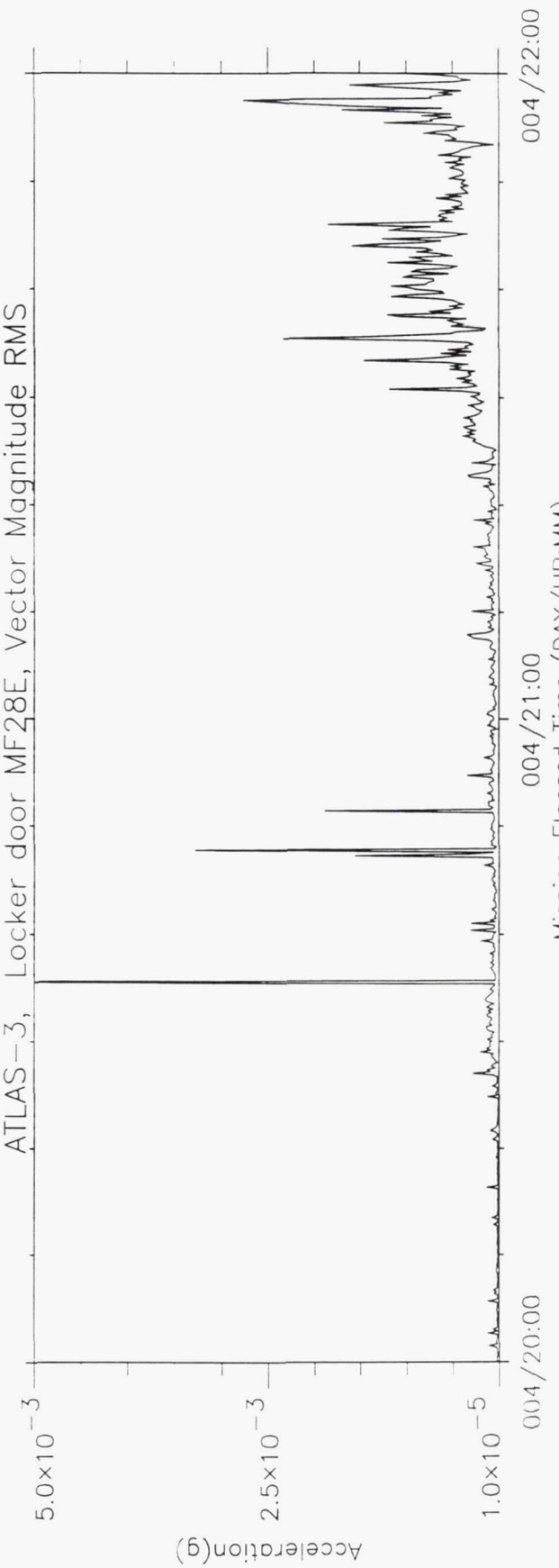
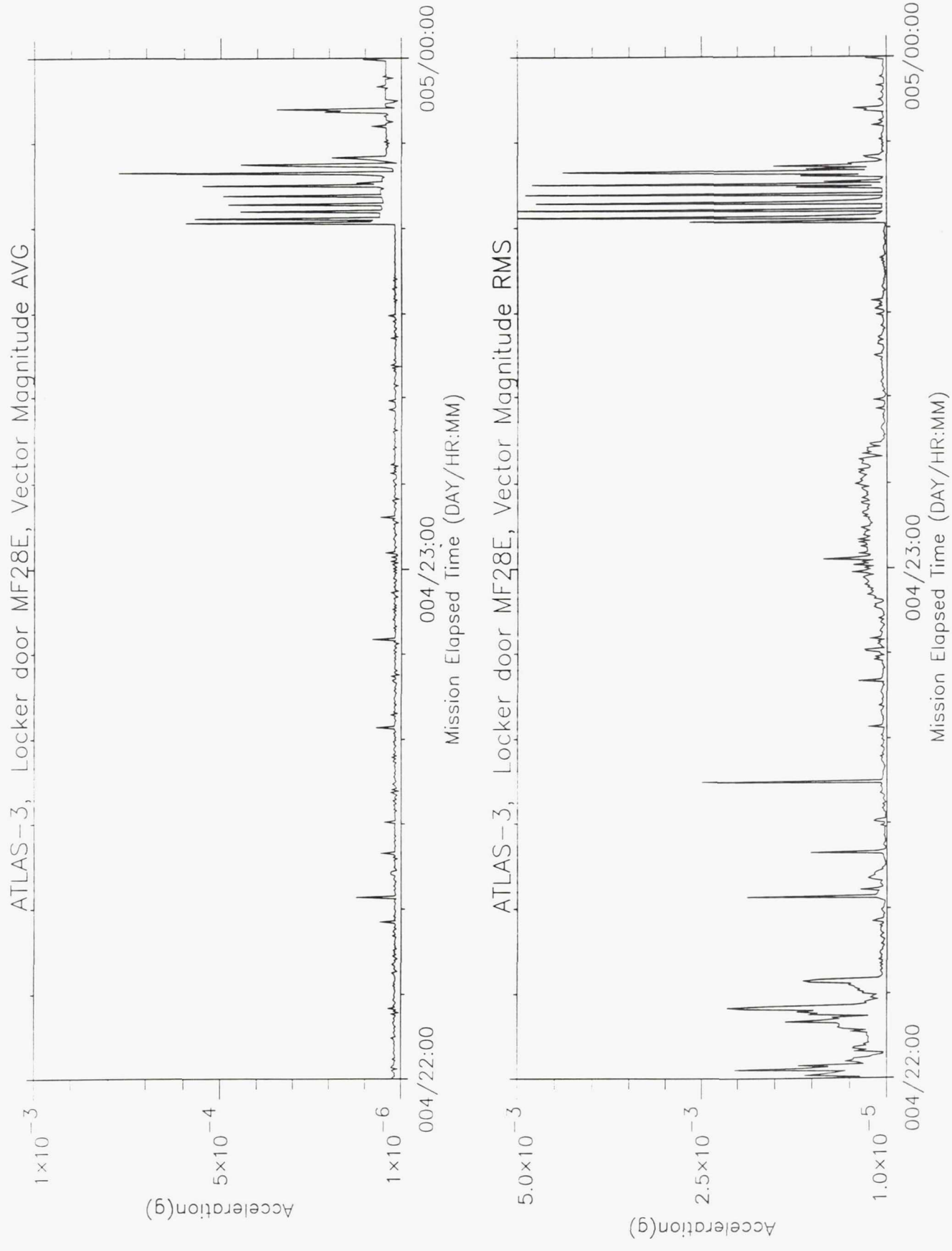
Acceleration(g)
004/16:00
004/17:00
004/18:00
Mission Elapsed Time (DAY/HR:MM)

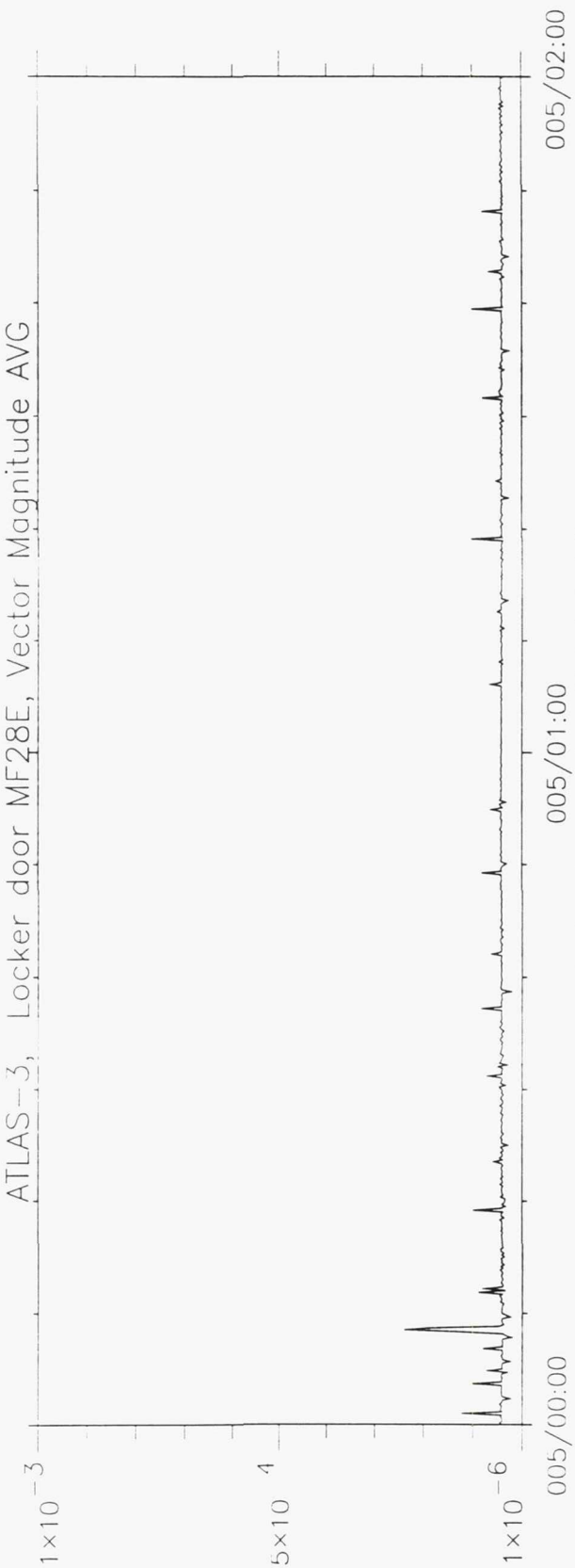

ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10⁻³
5×10⁻⁴
1×10⁻⁶
Acceleration(g)
004/18:00
004/19:00
004/20:00
Mission Elapsed Time (DAY/HR:MM)

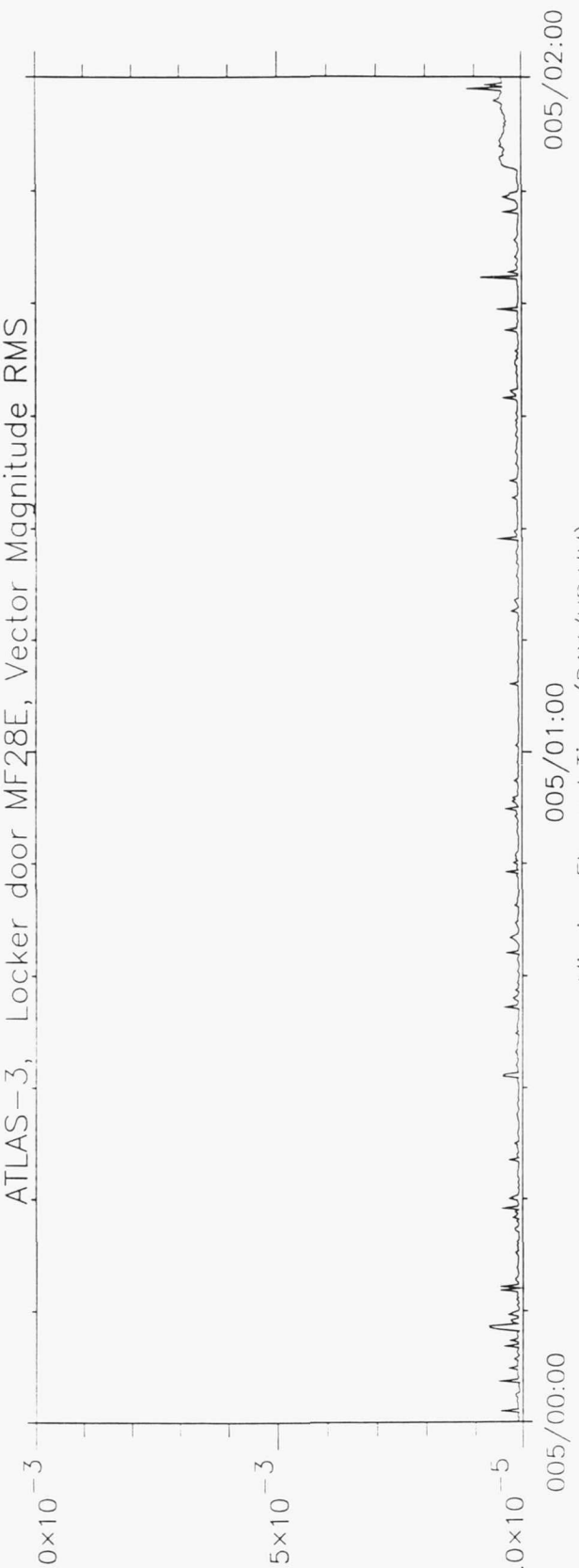

ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
Acceleration(g)
004/18:00
004/19:00
004/20:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10⁻³
5×10⁻⁴
1×10⁻⁶
Acceleration(g)
004/20:00
004/21:00
004/22:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
Acceleration(g)
004/20:00
004/21:00
004/22:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10^-3
5×10^-4
1×10^-6
Acceleration(g)
004/22:00
004/23:00
005/00:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
2.5×10^-3
1.0×10^-5
Acceleration(g)
004/22:00
004/23:00
005/00:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10^-3
5×10^-4
1×10^-6
Acceleration(g)
005/00:00
005/01:00
005/02:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
2.5×10^-3
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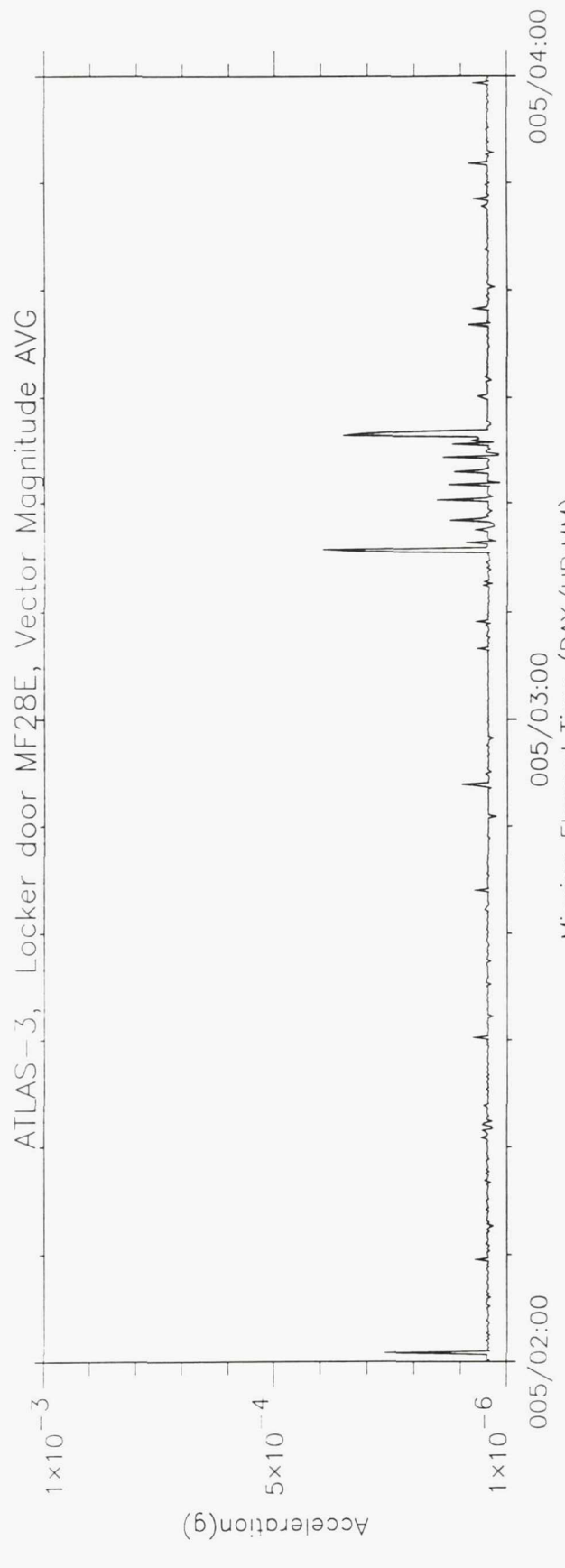
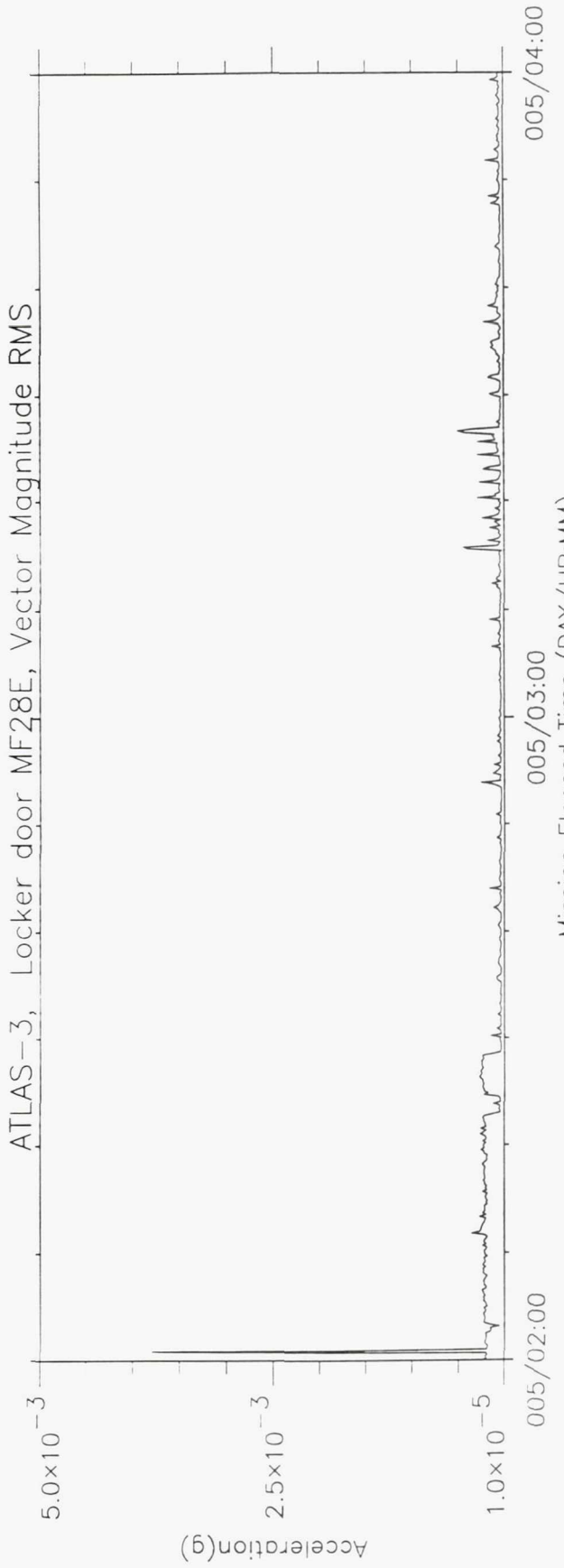
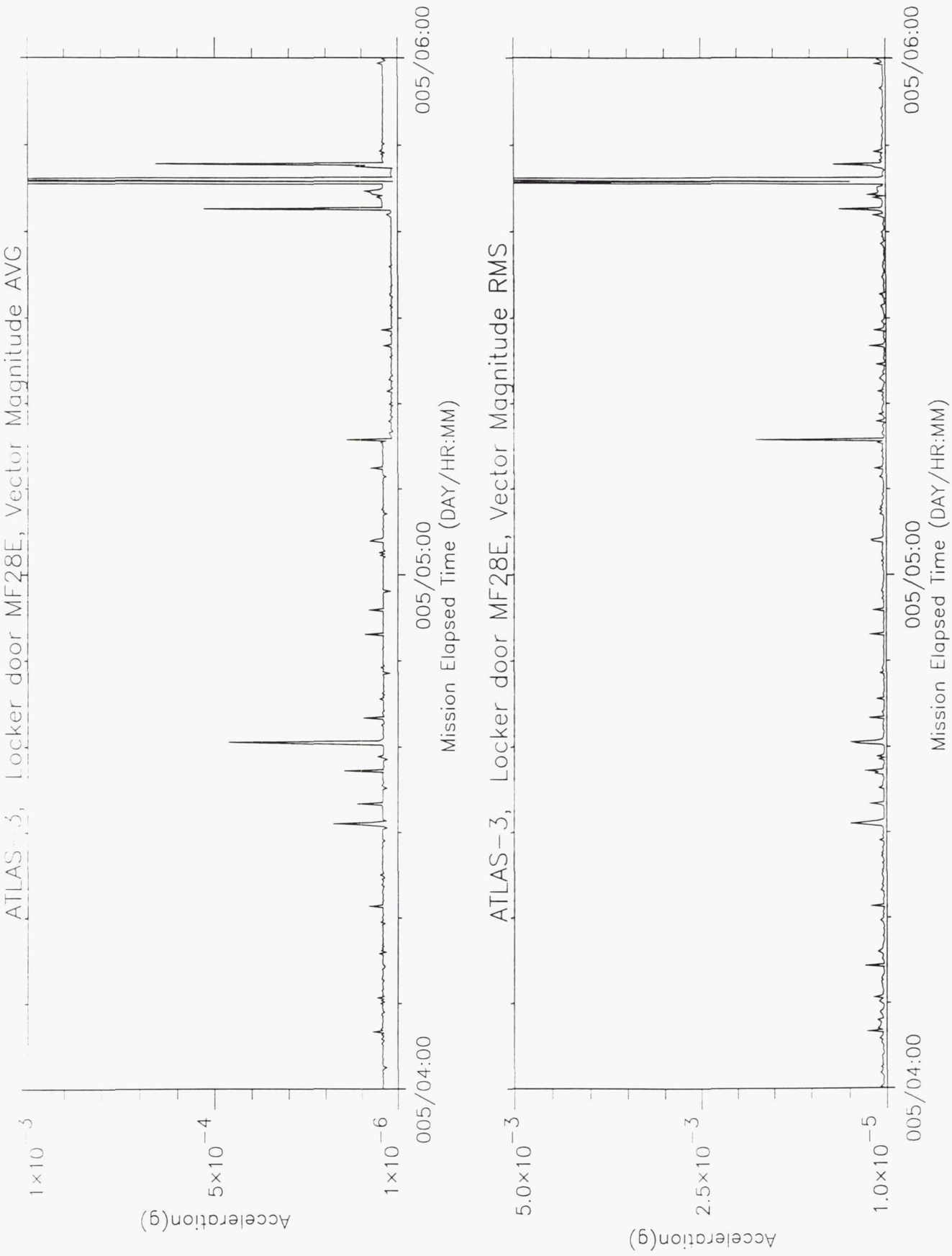
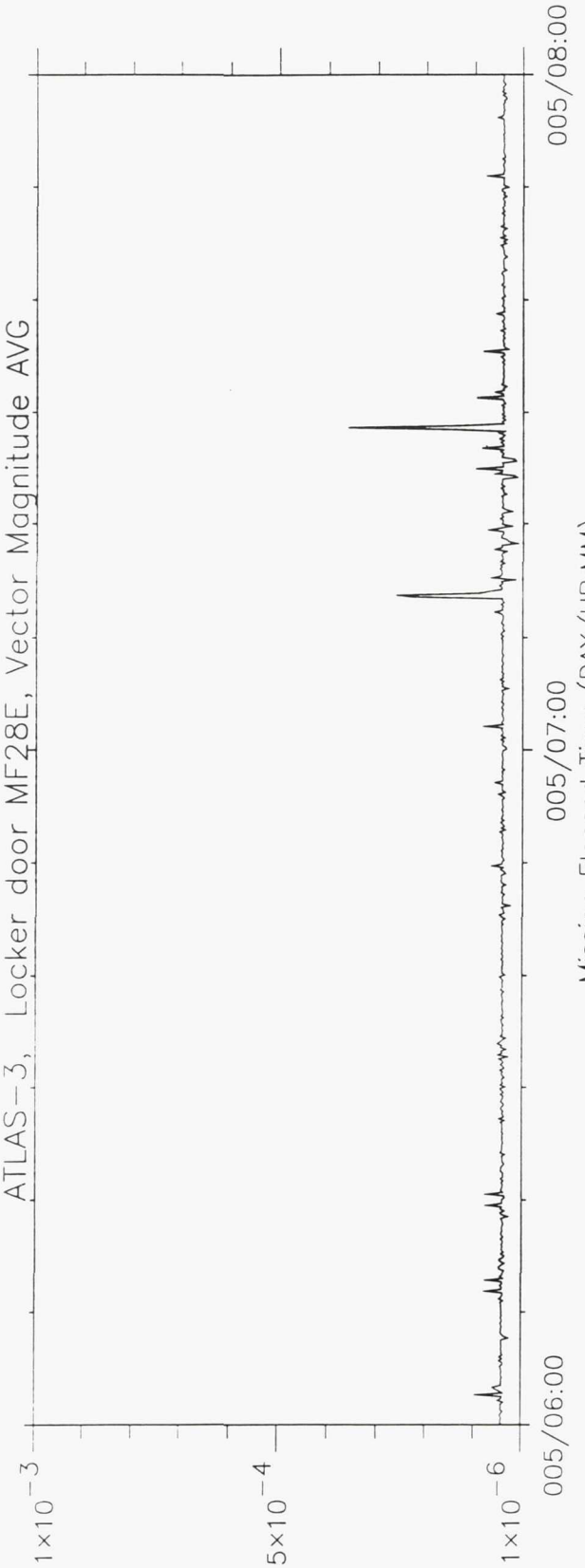
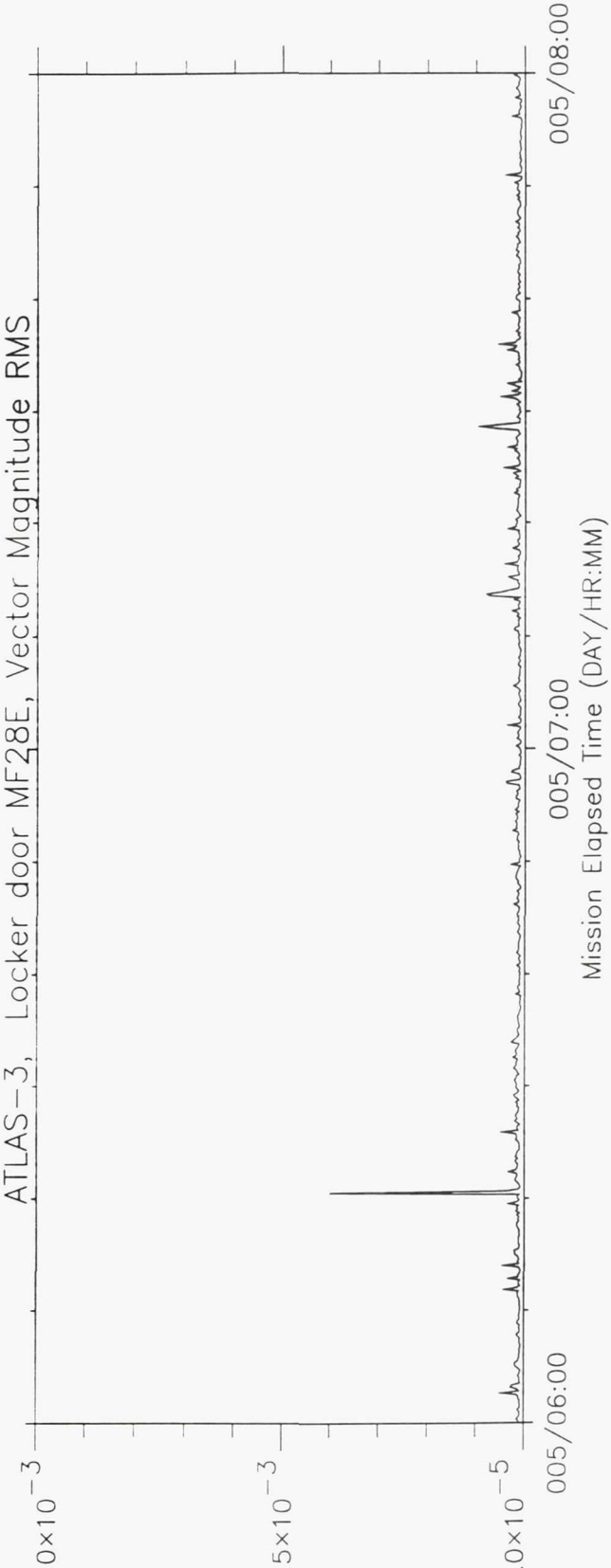
Acceleration(g)
005/00:00
005/01:00
005/02:00
Mission Elapsed Time (DAY/HR:MM)

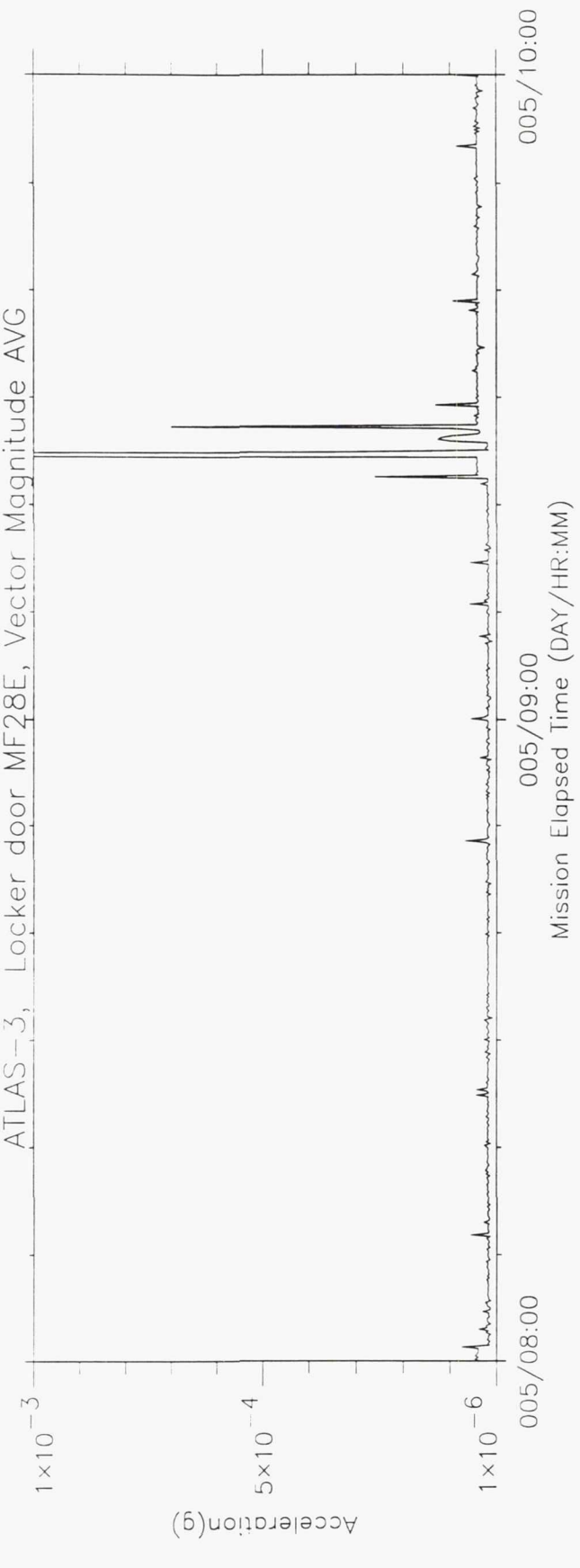

ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10⁻³
5×10⁻⁴
1×10⁻⁶
Acceleration(g)
005/02:00
005/03:00
005/04:00
Mission Elapsed Time (DAY/HR:MM)

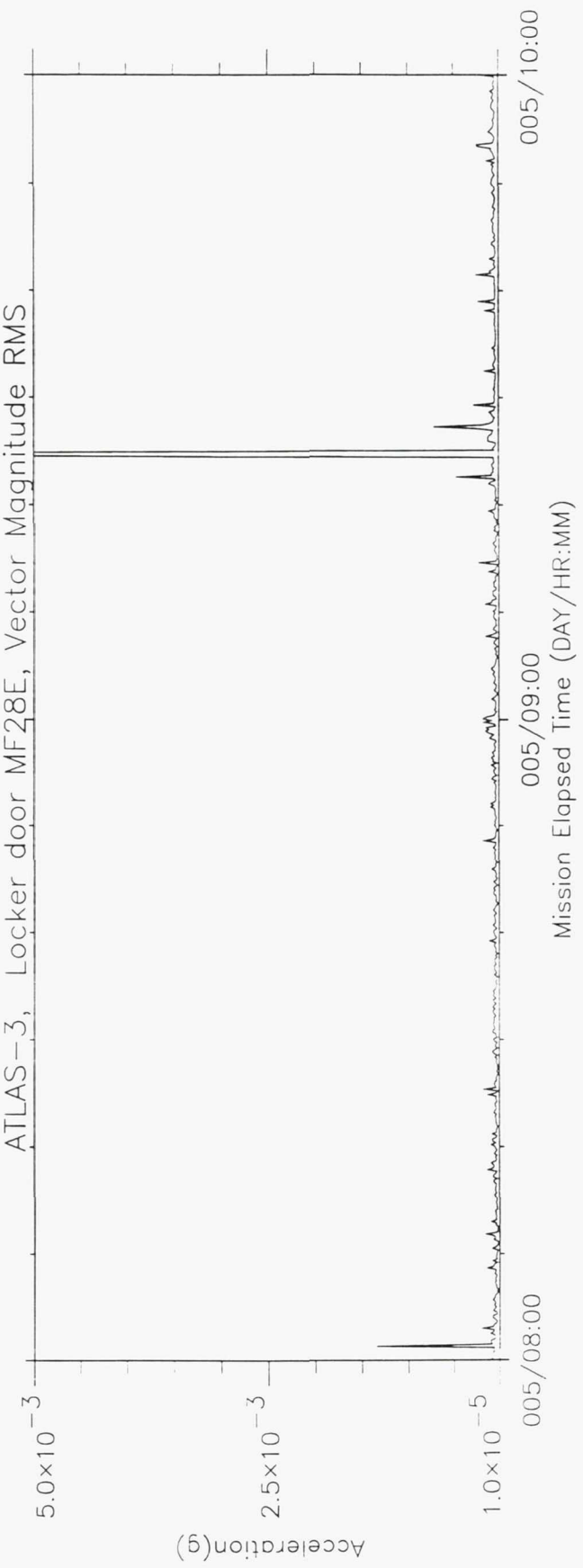

ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
Acceleration(g)
005/02:00
005/03:00
005/04:00
Mission Elapsed Time (DAY/HR:MM)

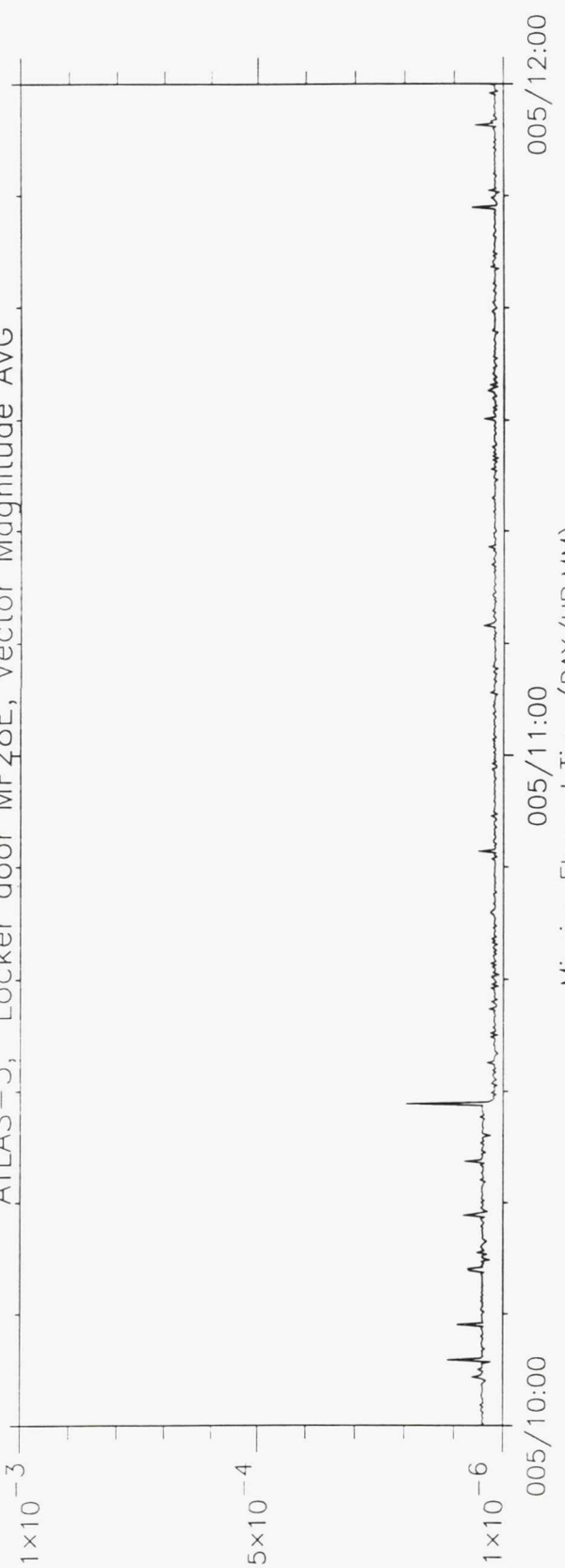

ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10^-3
5×10^-4
1×10^-6
Acceleration(g)
005/04:00
005/05:00
005/06:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
2.5×10^-3
1.0×10^-5
Acceleration(g)
005/04:00
005/05:00
005/06:00
Mission Elapsed Time (DAY/HR:MM)

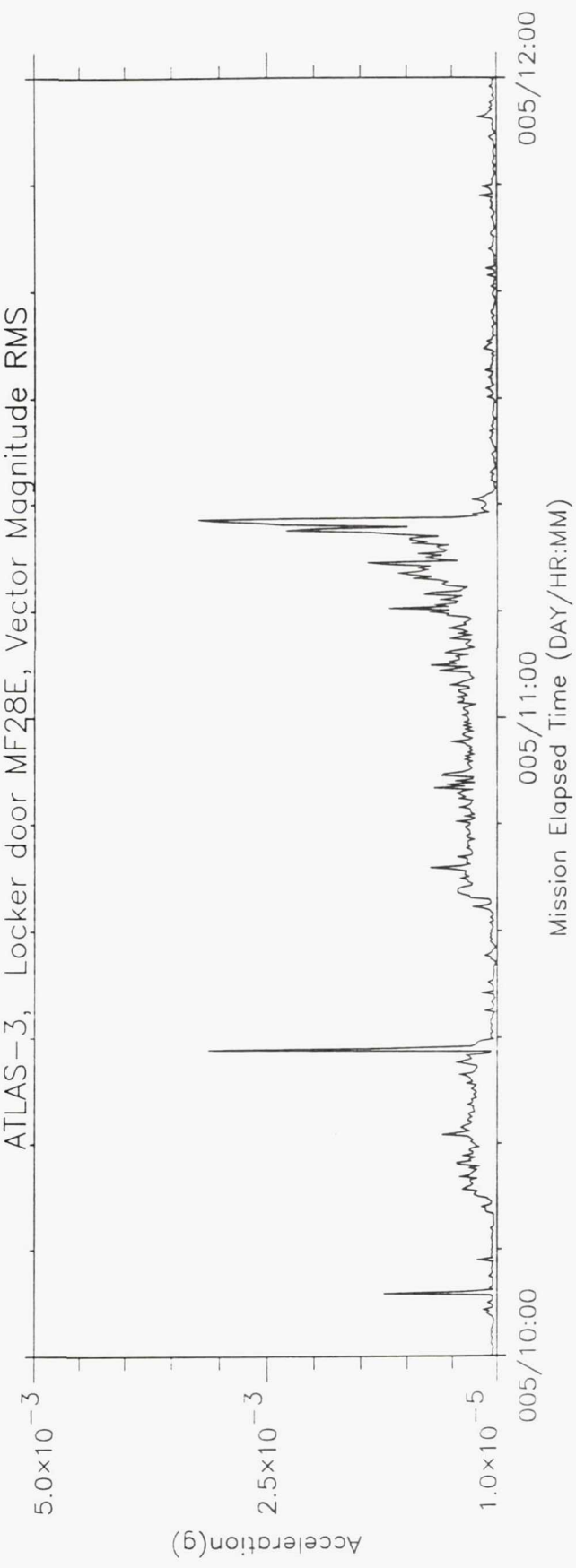

ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
1×10⁻³
5×10⁻⁴
1×10⁻⁶
005/06:00
005/07:00
005/08:00
Mission Elapsed Time (DAY/HR:MM)

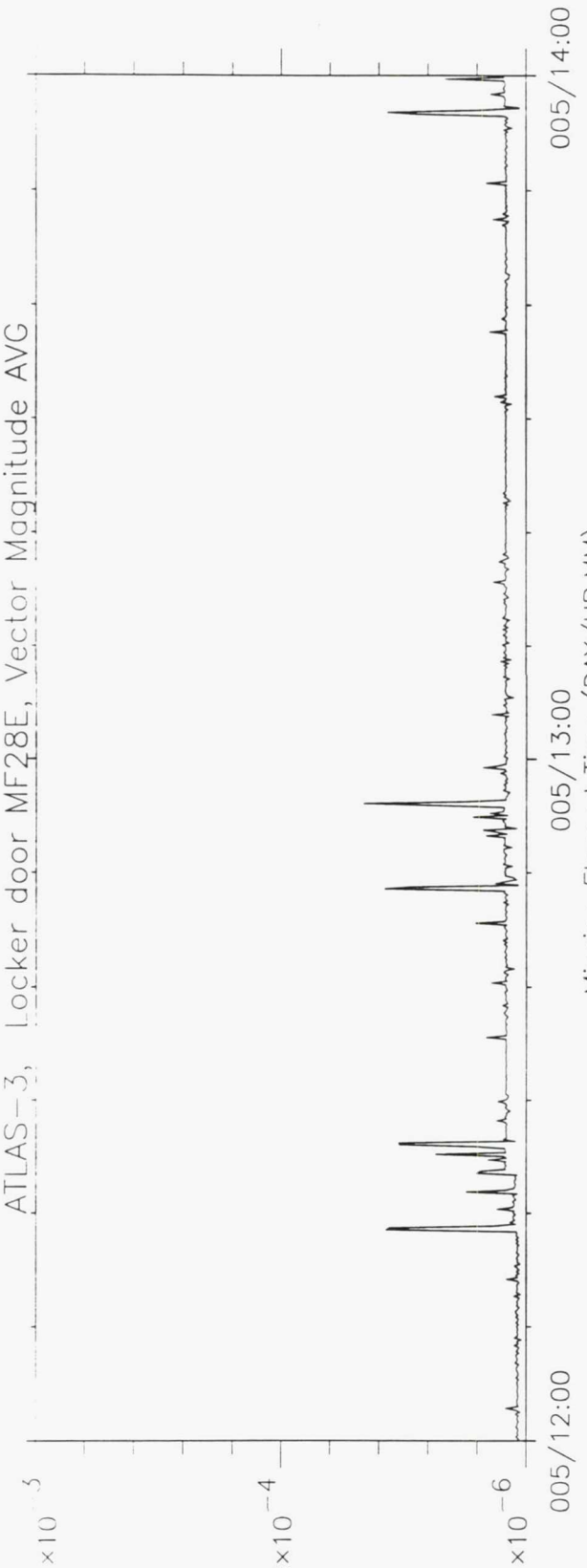

ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
005/06:00
005/07:00
005/08:00
Mission Elapsed Time (DAY/HR:MM)

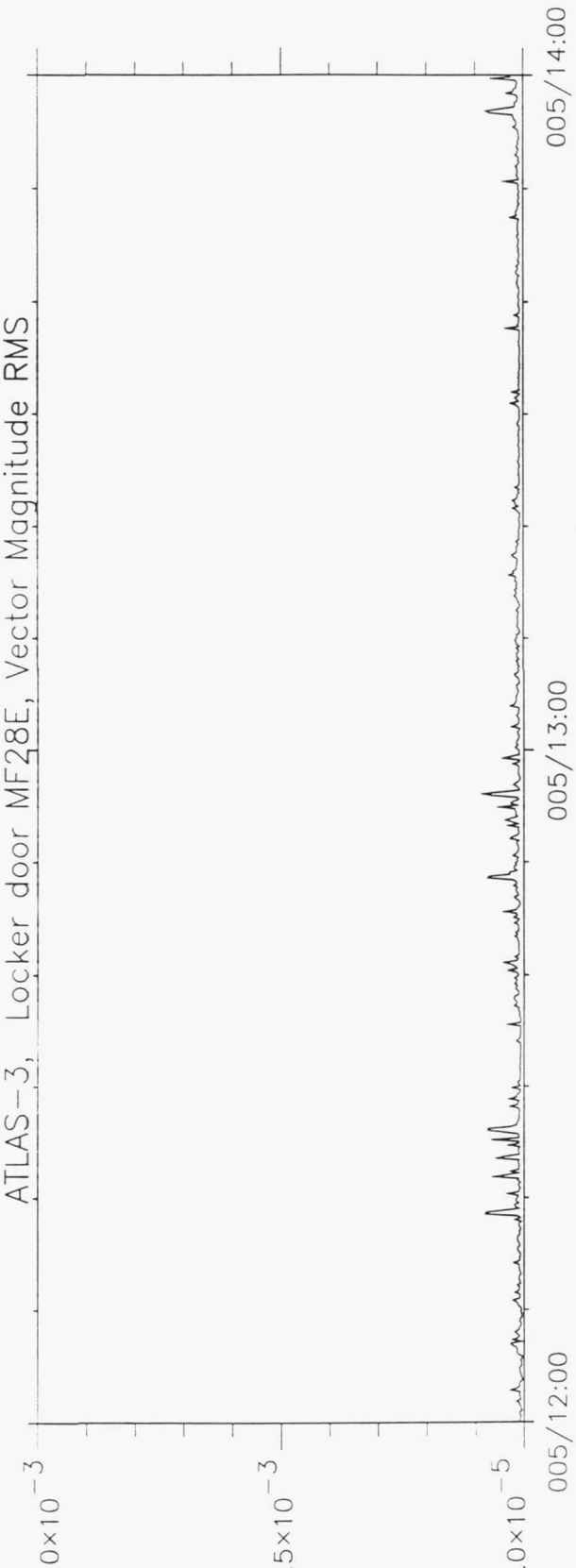

ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
1×10⁻³
5×10⁻⁴
1×10⁻⁶
005/08:00
005/09:00
005/10:00
Mission Elapsed Time (DAY/HR:MM)

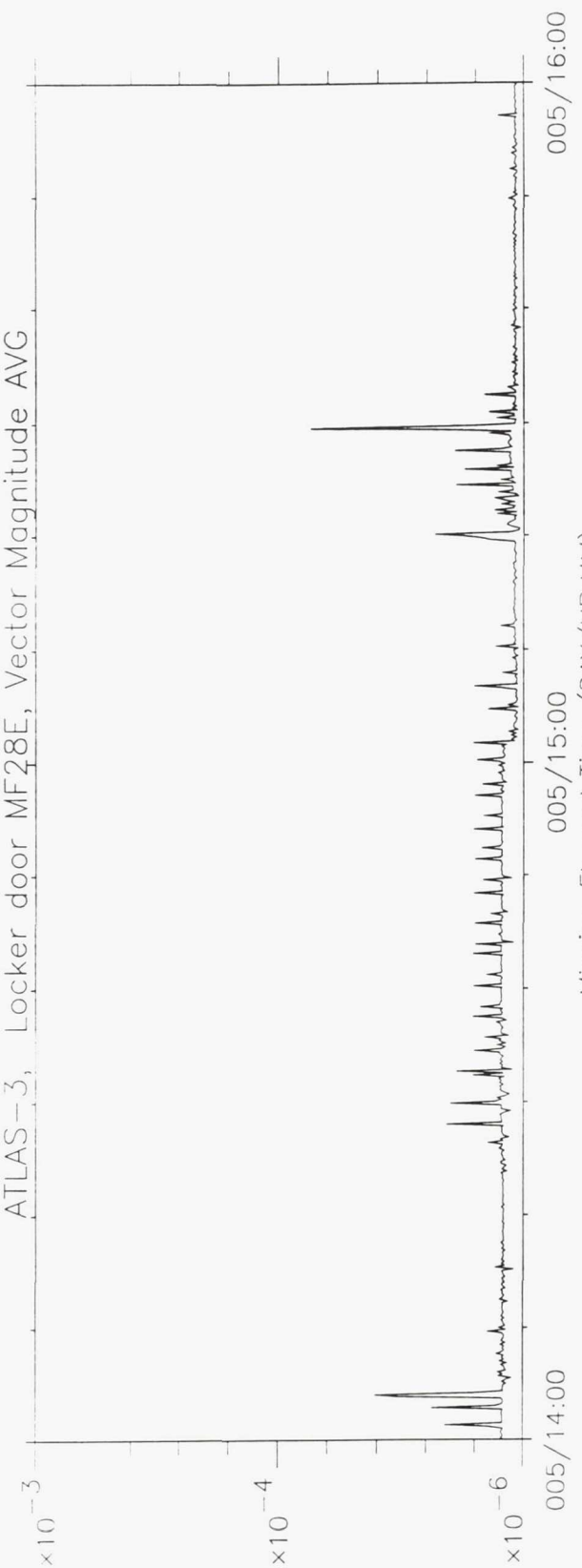

ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
005/08:00
005/09:00
005/10:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10^-3
5×10^-4
1×10^-6
Acceleration(g)
005/10:00
005/11:00
005/12:00
Mission Elapsed Time (DAY/HR:MM)

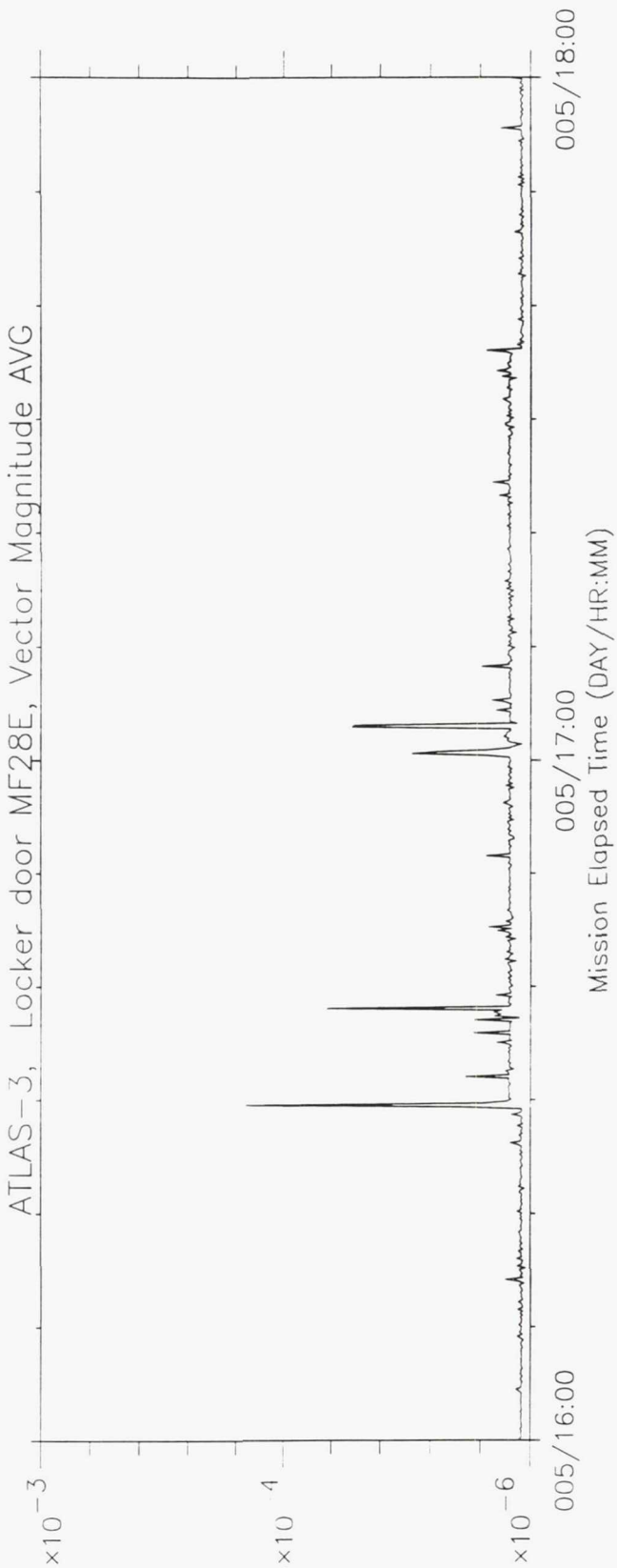

ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
2.5×10^-3
1.0×10^-5
Acceleration(g)
005/10:00
005/11:00
005/12:00
Mission Elapsed Time (DAY/HR:MM)

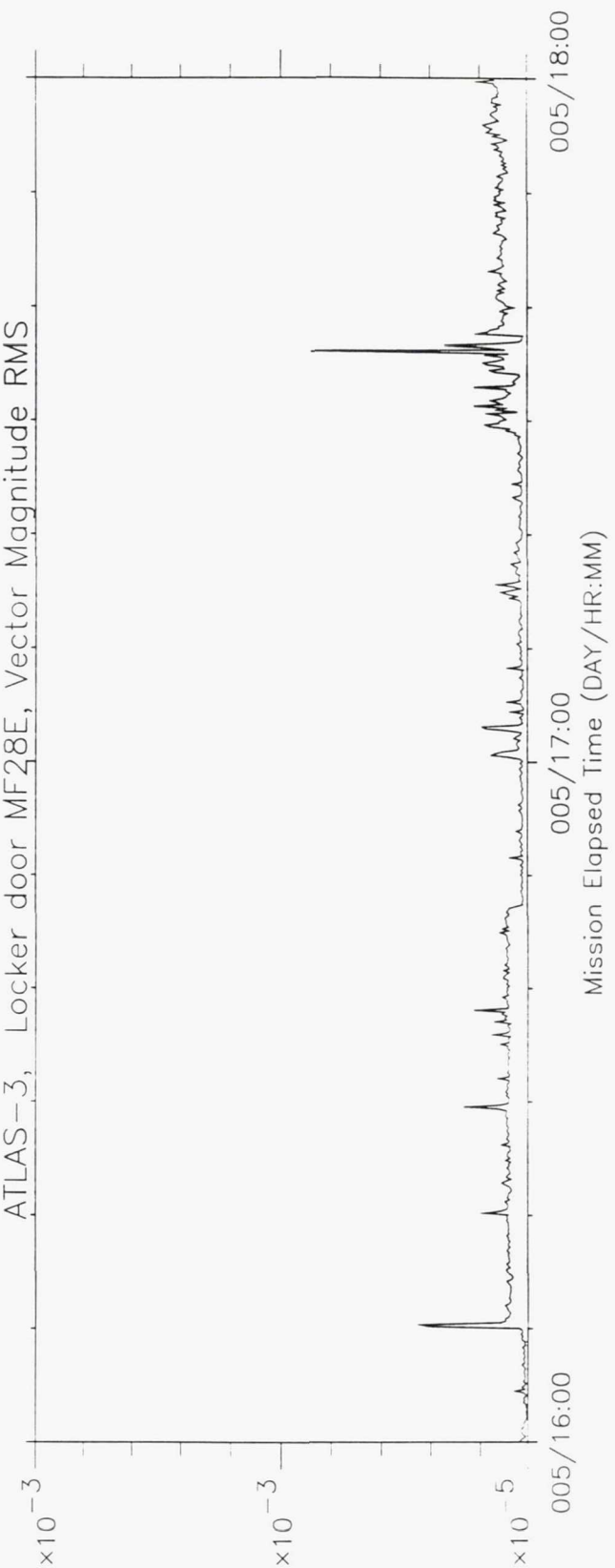

ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10⁻³
5×10⁻⁴
1×10⁻⁶
Acceleration(g)
005/12:00
005/13:00
005/14:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
Acceleration(g)
005/12:00
005/13:00
005/14:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10⁻³
5×10⁻⁴
1×10⁻⁶
Acceleration(g)
005/14:00
005/15:00
005/16:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
Acceleration(g)
005/14:00
005/15:00
005/16:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
1×10^-3
5×10^-4
1×10^-6
005/16:00
005/17:00
005/18:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
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2.5×10^-3
1.0×10^-5
005/16:00
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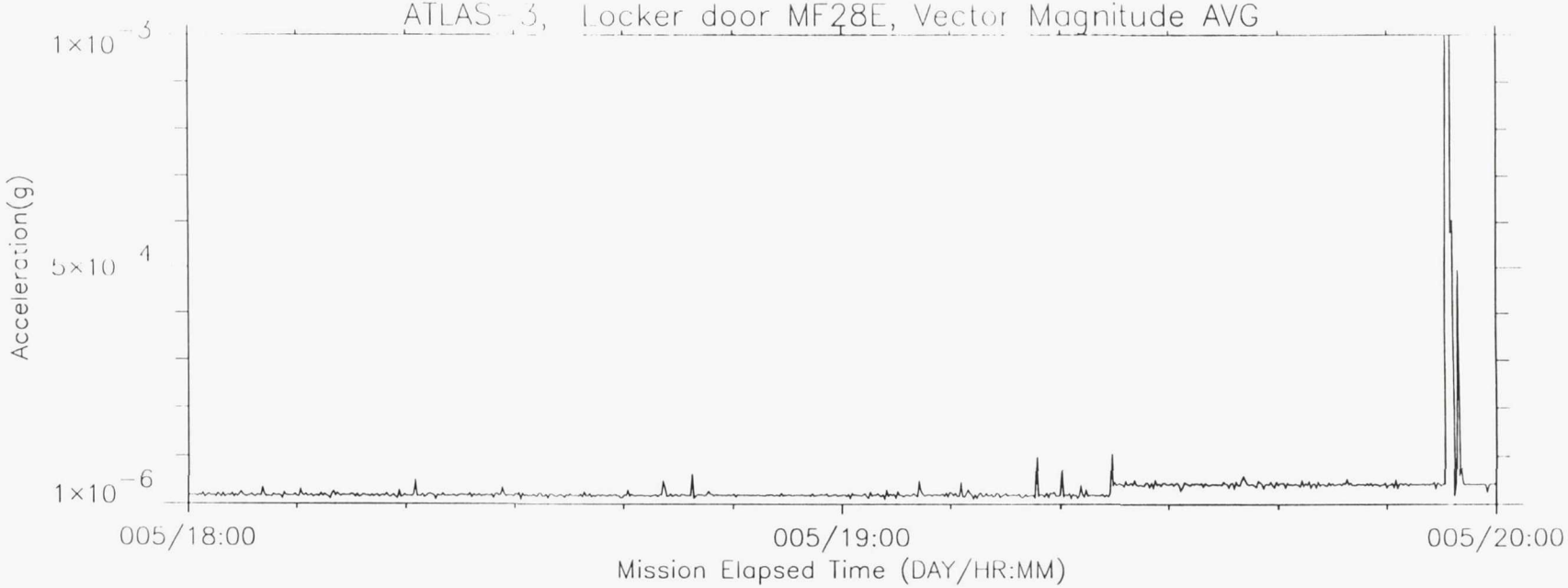
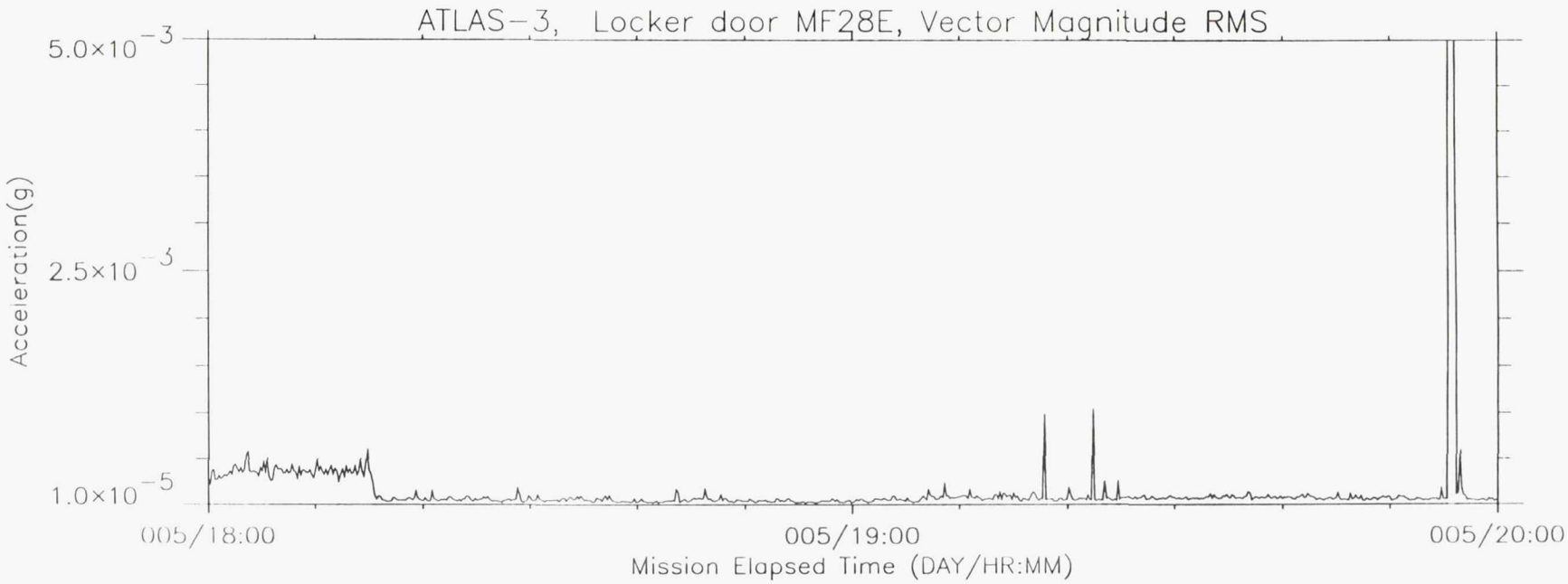
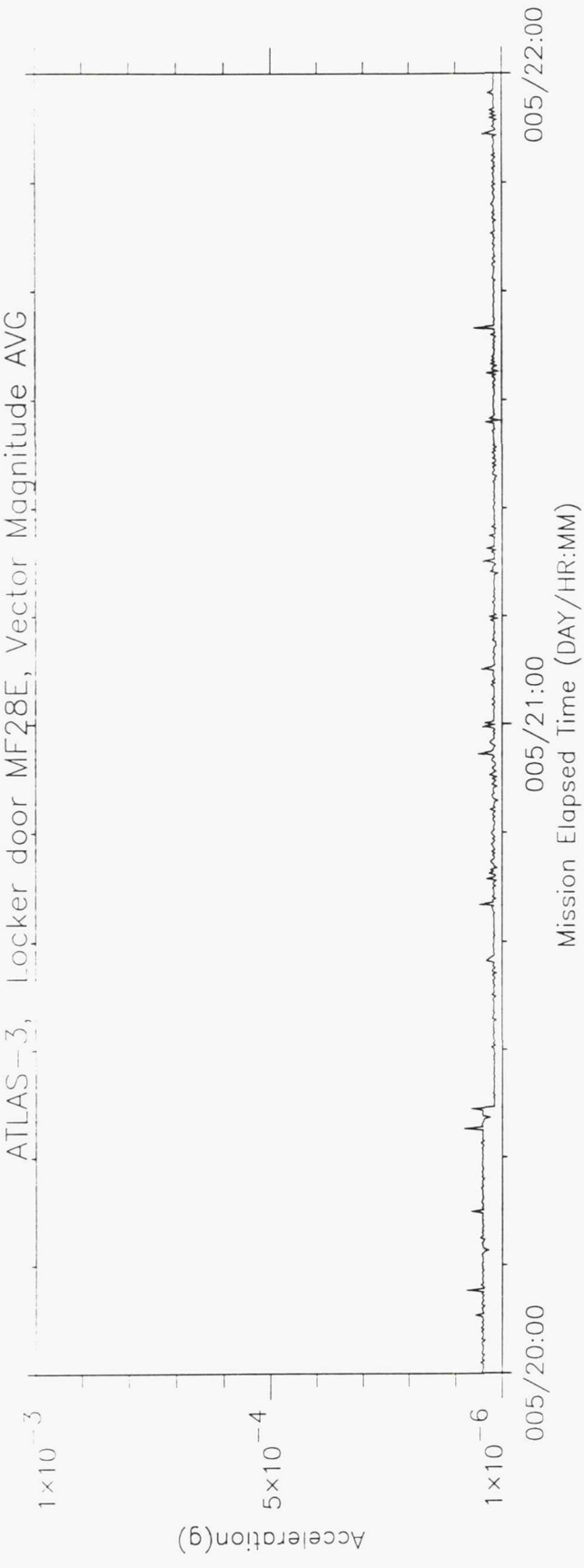
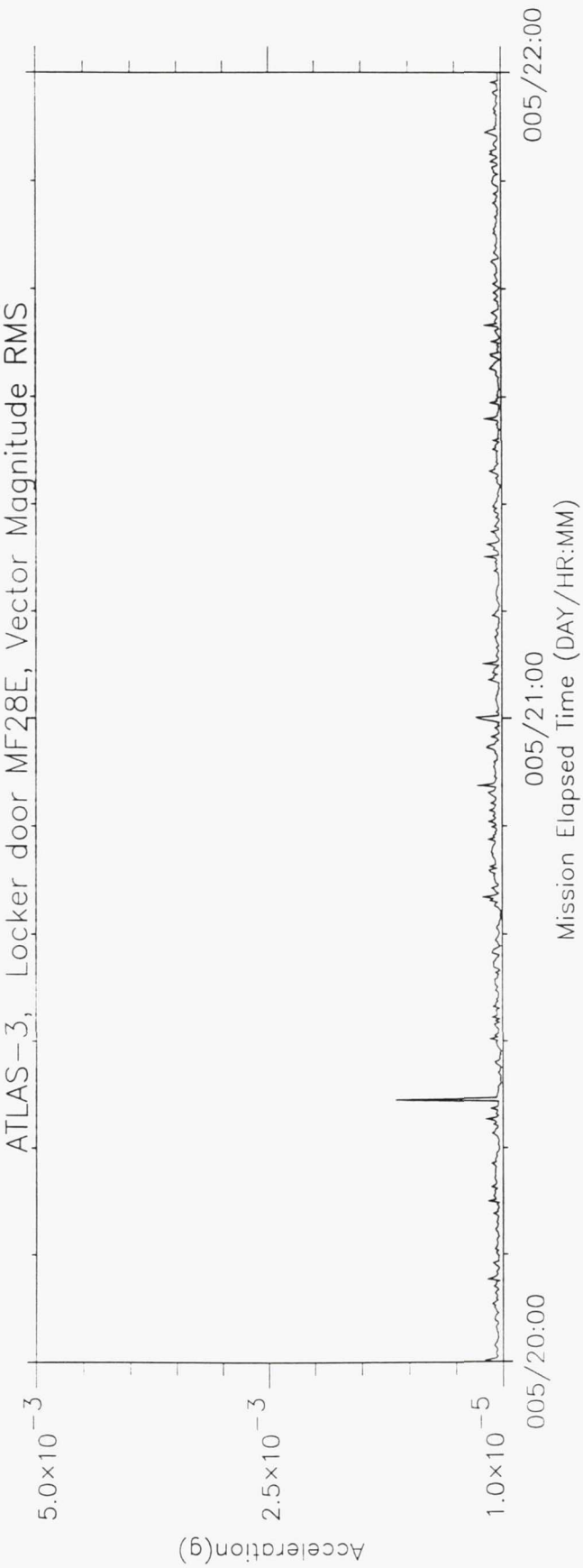
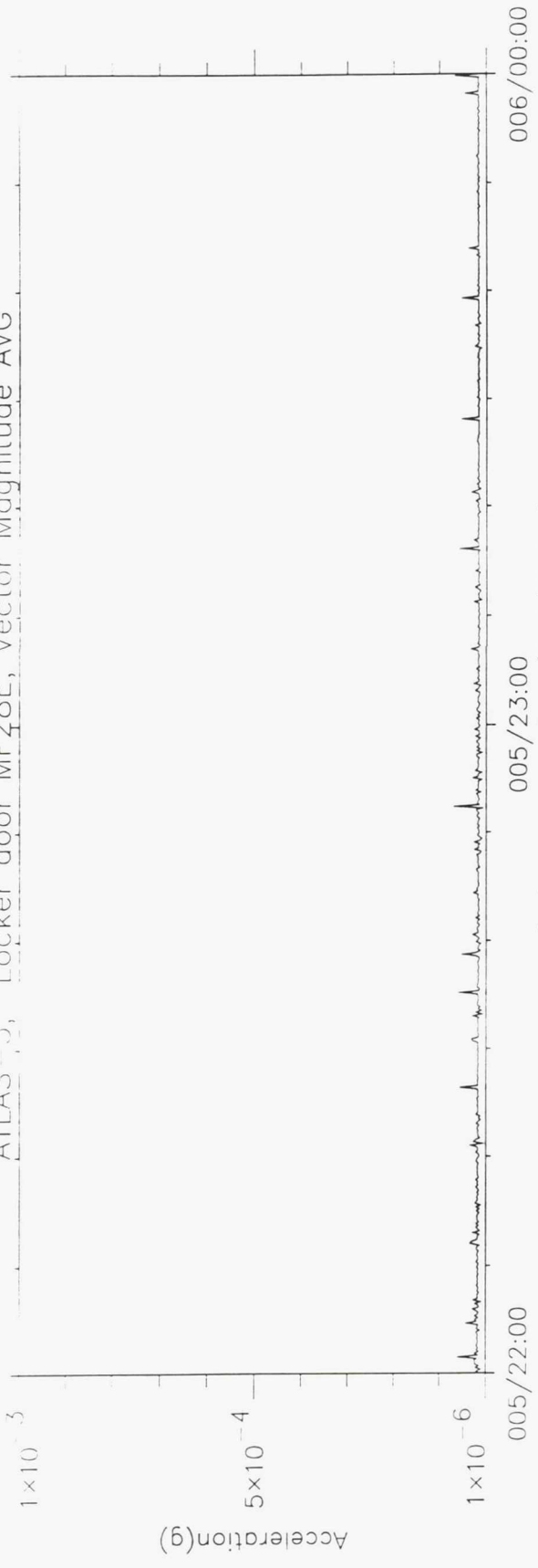
Mission Elapsed Time (DAY/HR:MM)

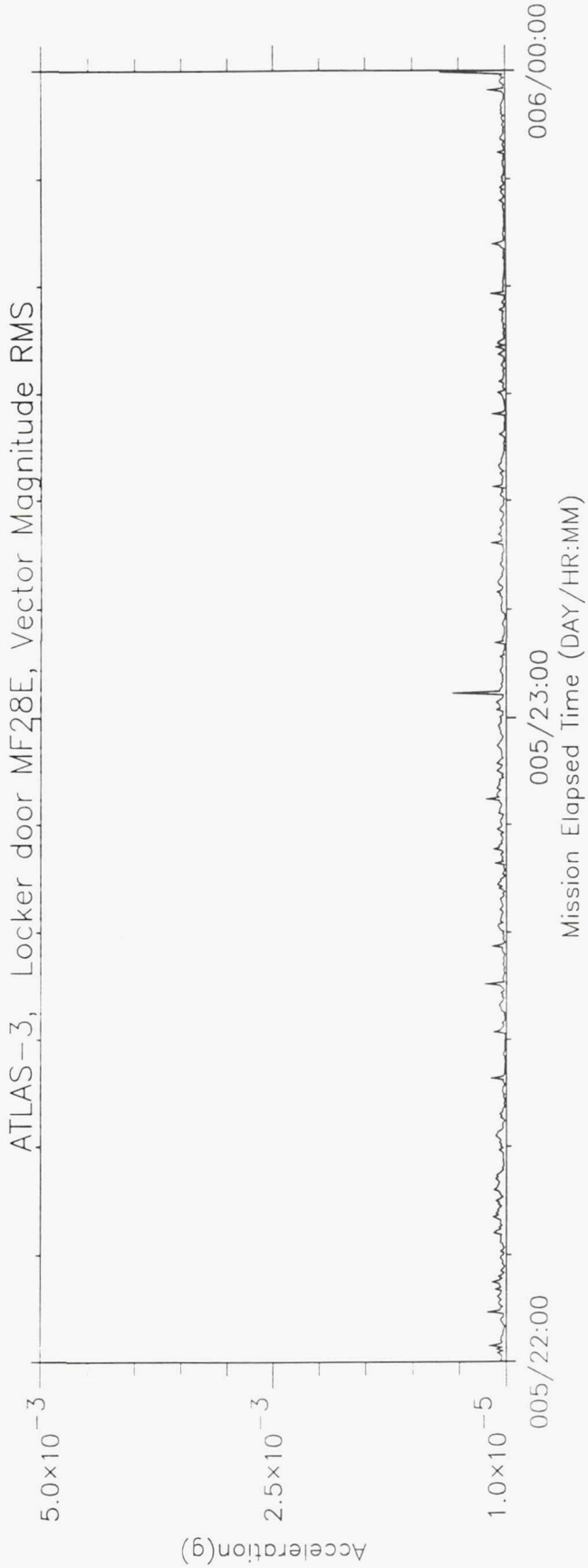

ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10⁻³
5×10⁻⁴
1×10⁻⁶
Acceleration(g)
005/18:00
005/19:00
005/20:00
Mission Elapsed Time (DAY/HR:MM)

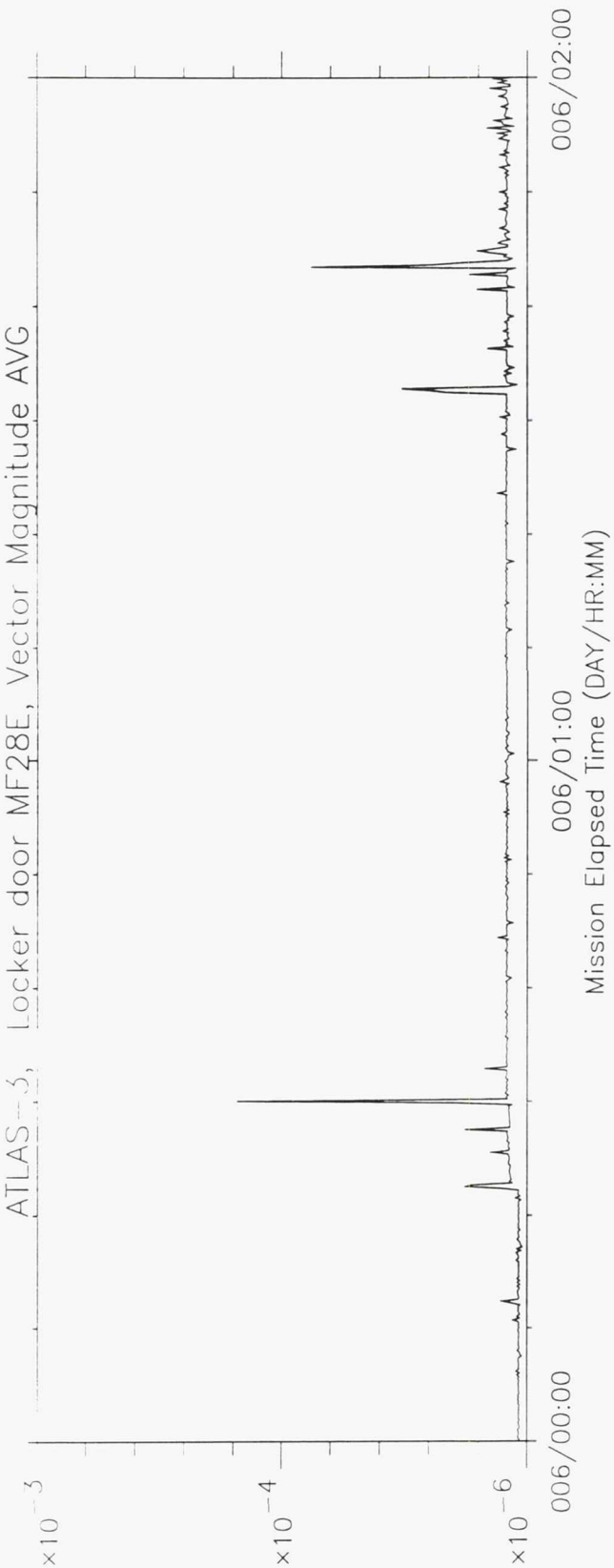

ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
Acceleration(g)
005/18:00
005/19:00
005/20:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10⁻³
5×10⁻⁴
1×10⁻⁶
Acceleration(g)
005/20:00
005/21:00
005/22:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
Acceleration(g)
005/20:00
005/21:00
005/22:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10⁻³
5×10⁻⁴
1×10⁻⁶
Acceleration(g)
005/22:00
005/23:00
006/00:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
Acceleration(g)
005/22:00
005/23:00
006/00:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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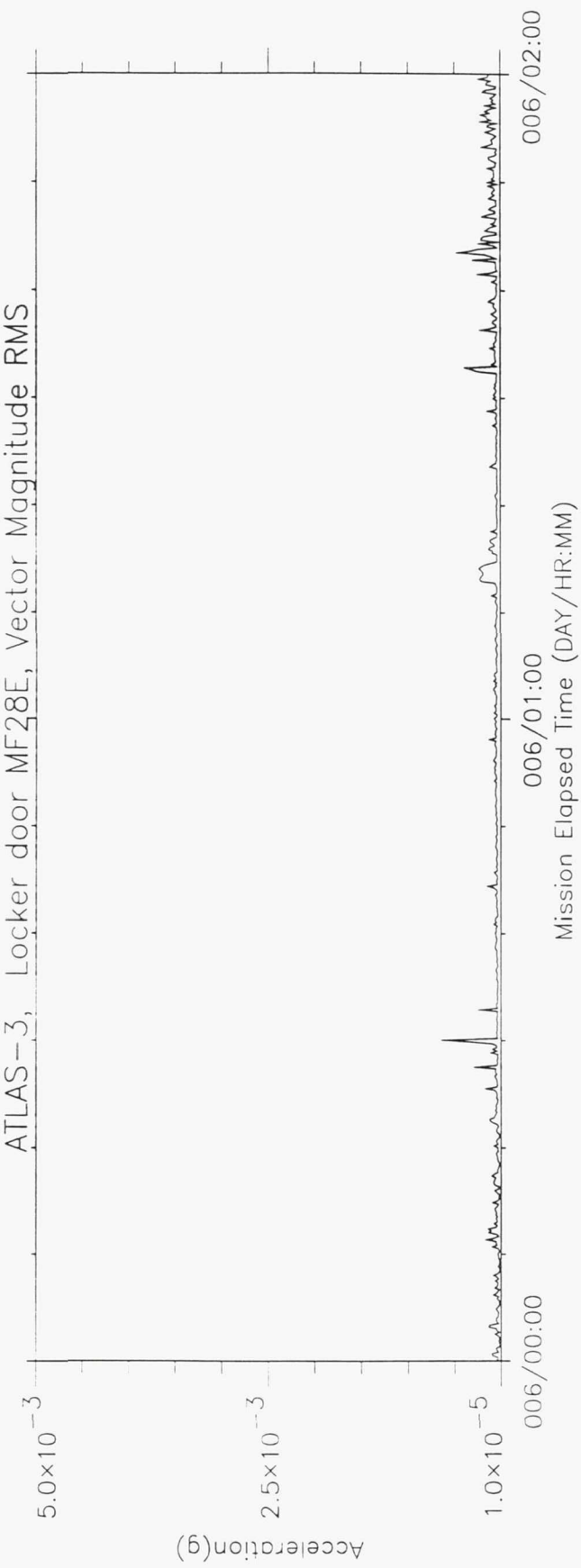
1×10^-6
Acceleration(g)
006/00:00
006/01:00
006/02:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
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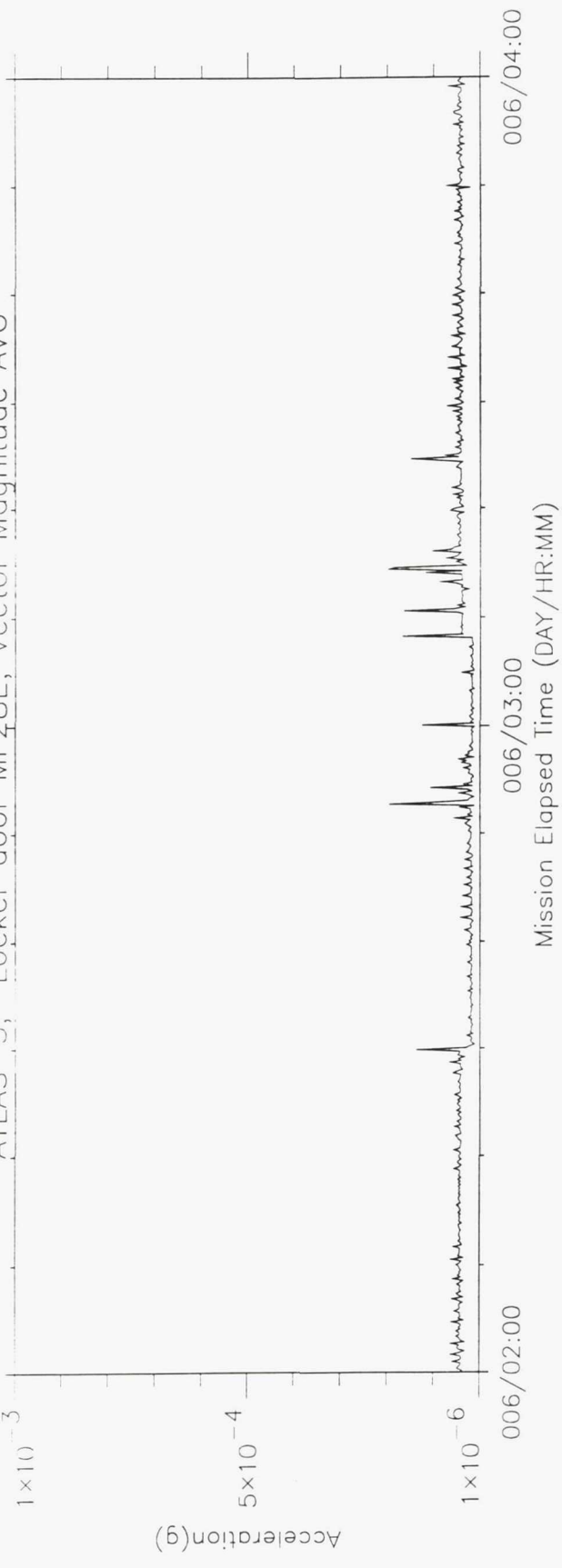
Acceleration(g)
006/00:00
006/01:00
006/02:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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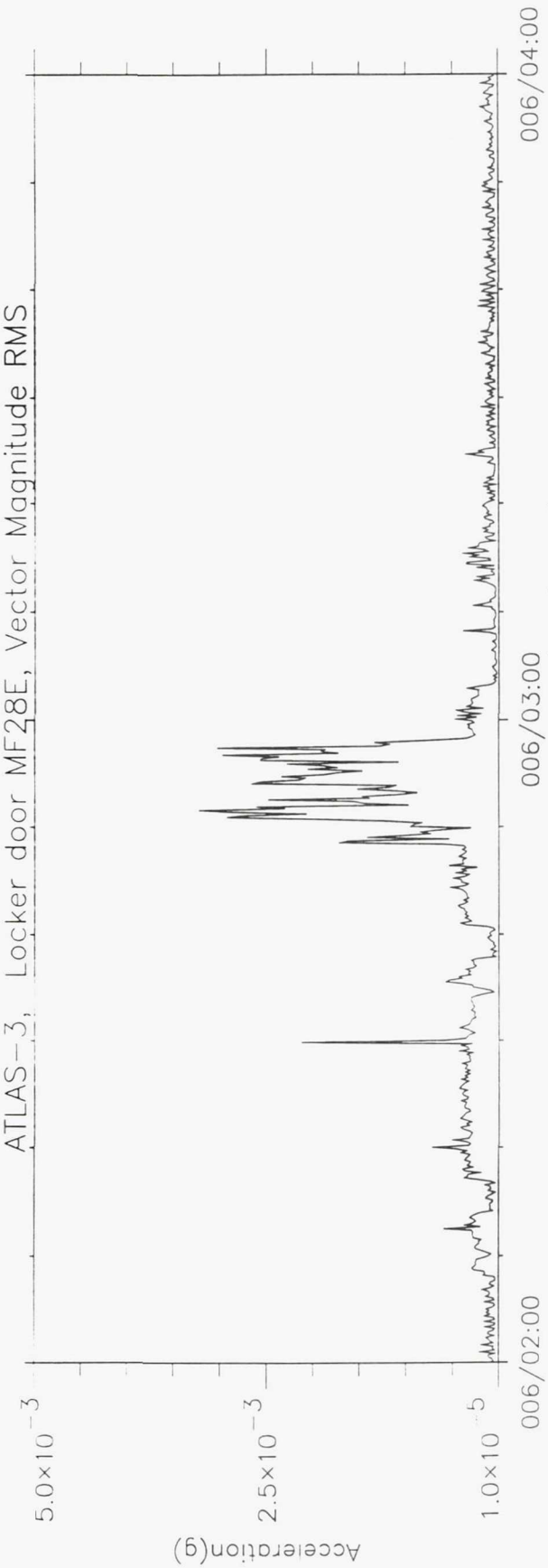
5×10^-4
1×10^-6
Acceleration(g)
006/02:00
006/03:00
006/04:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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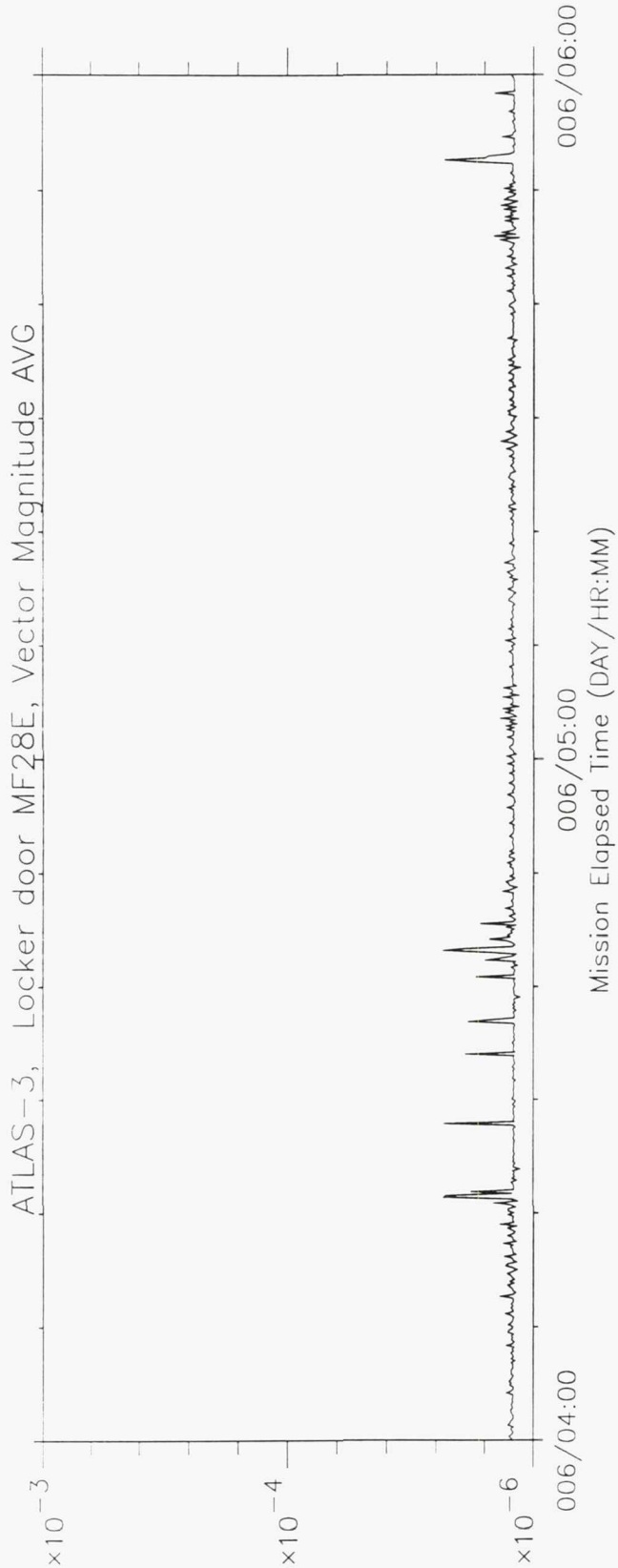
Acceleration(g)
006/02:00
006/03:00
006/04:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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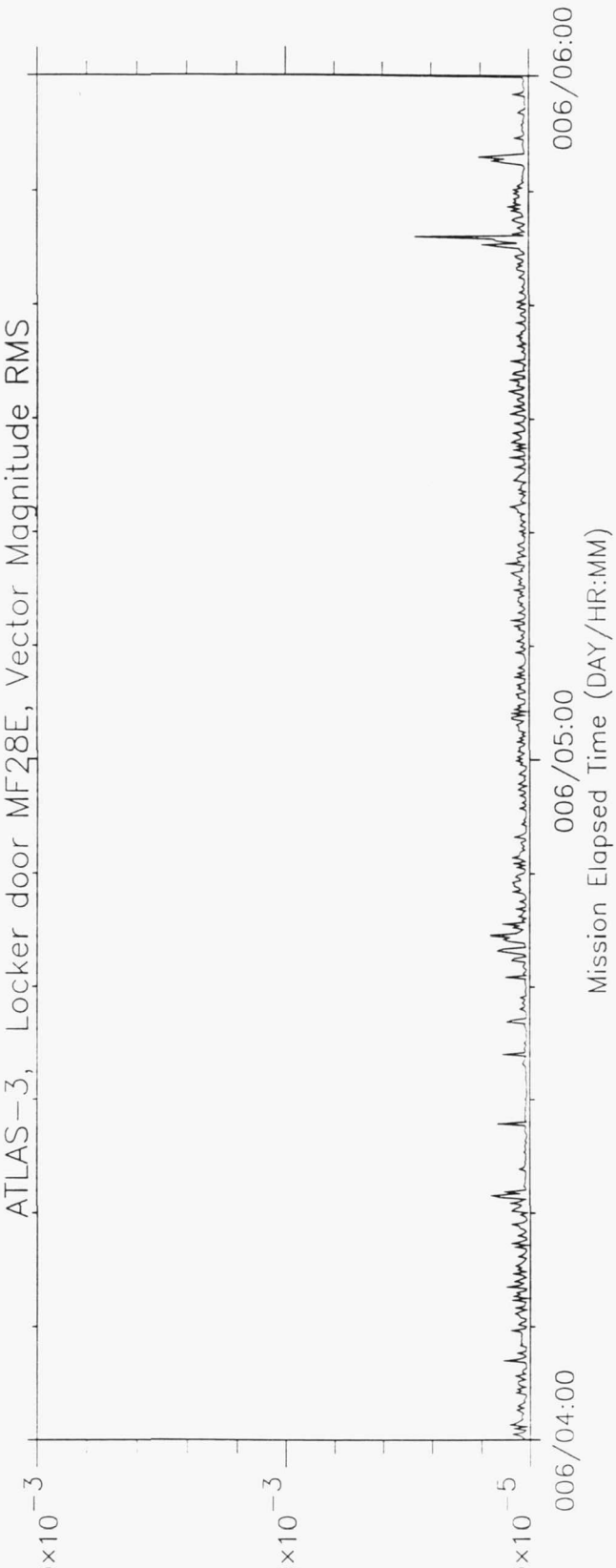
5×10^-4
1×10^-6
Acceleration(g)
006/04:00
006/05:00
006/06:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
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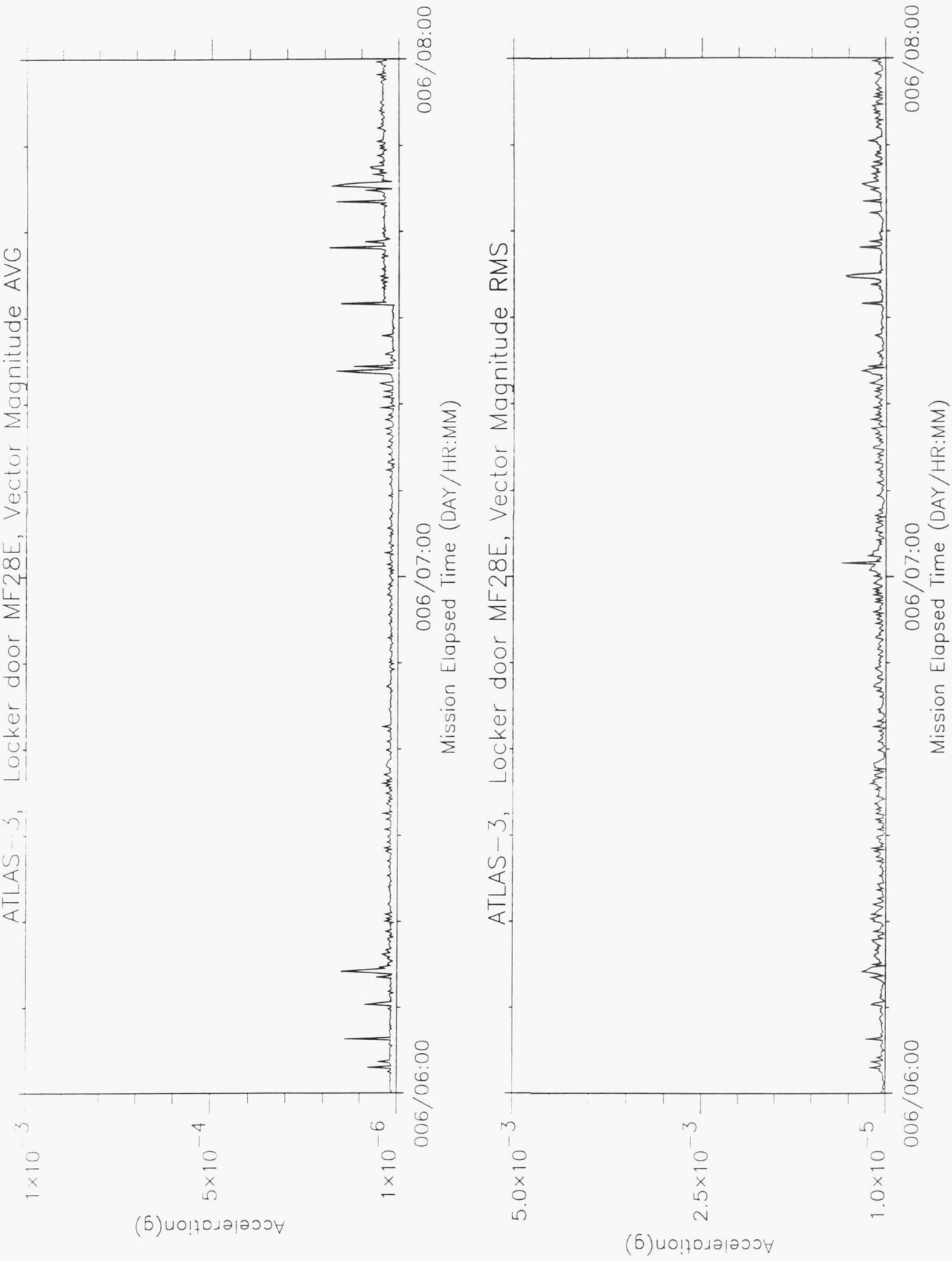
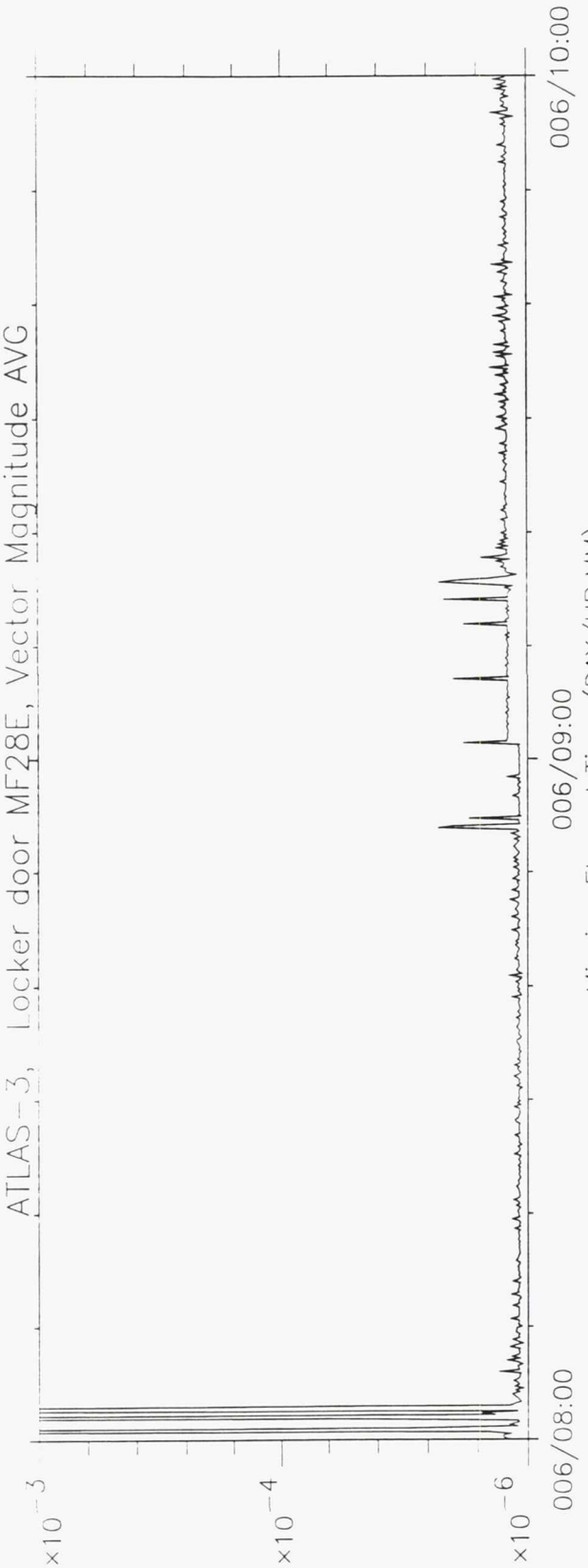
Acceleration(g)
006/04:00
006/05:00
006/06:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
1×10⁻³
5×10⁻⁴
1×10⁻⁶
006/06:00
006/07:00
006/08:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
006/06:00
006/07:00
006/08:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
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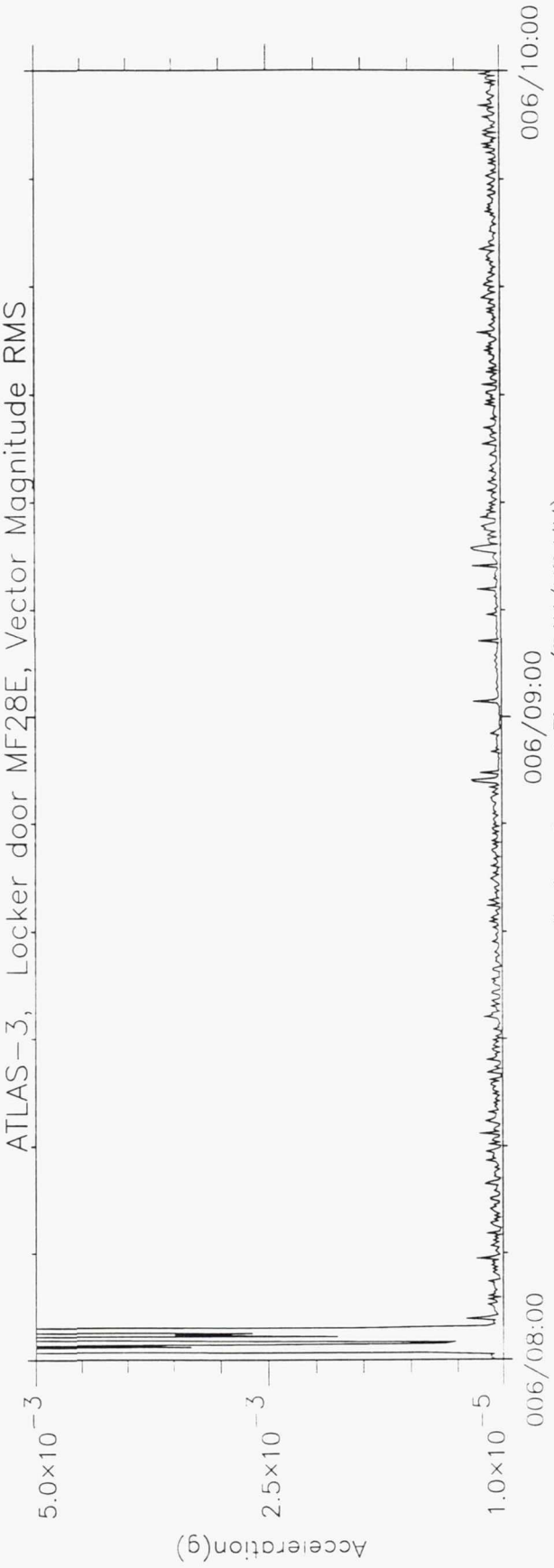
5×10^-4
1×10^-6
006/08:00
006/09:00
006/10:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
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2.5×10^-3
1.0×10^-5
006/08:00
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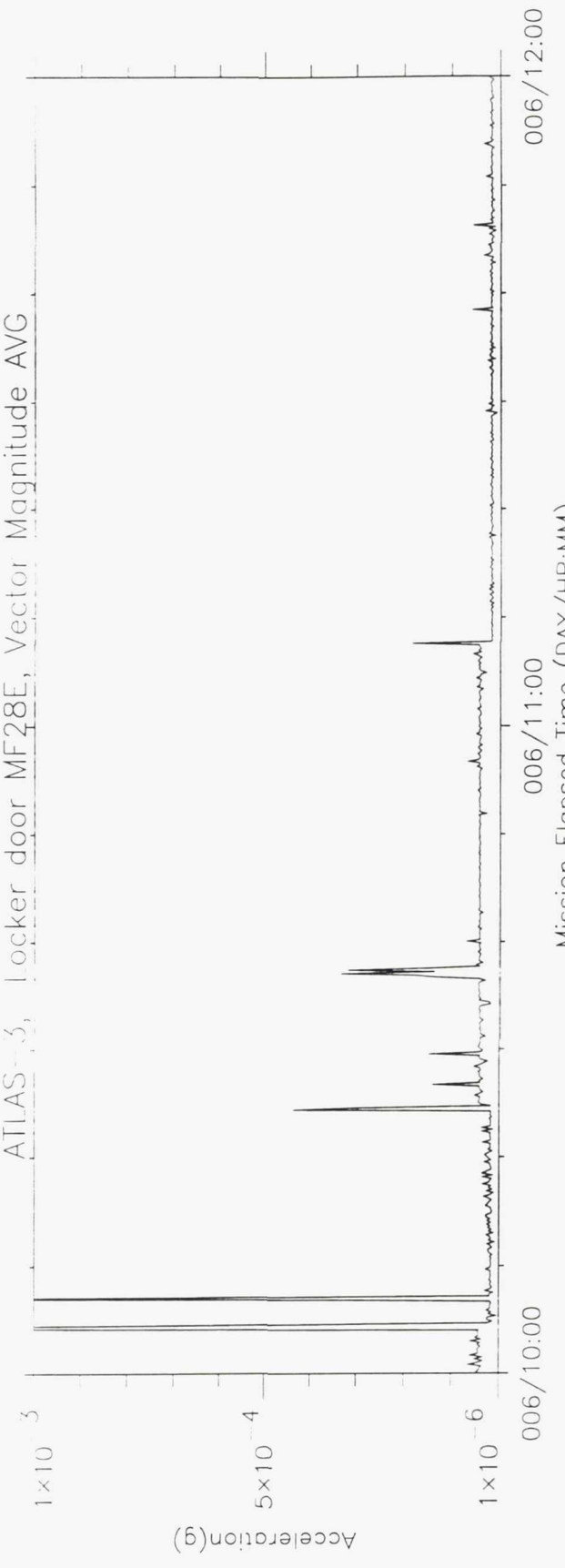
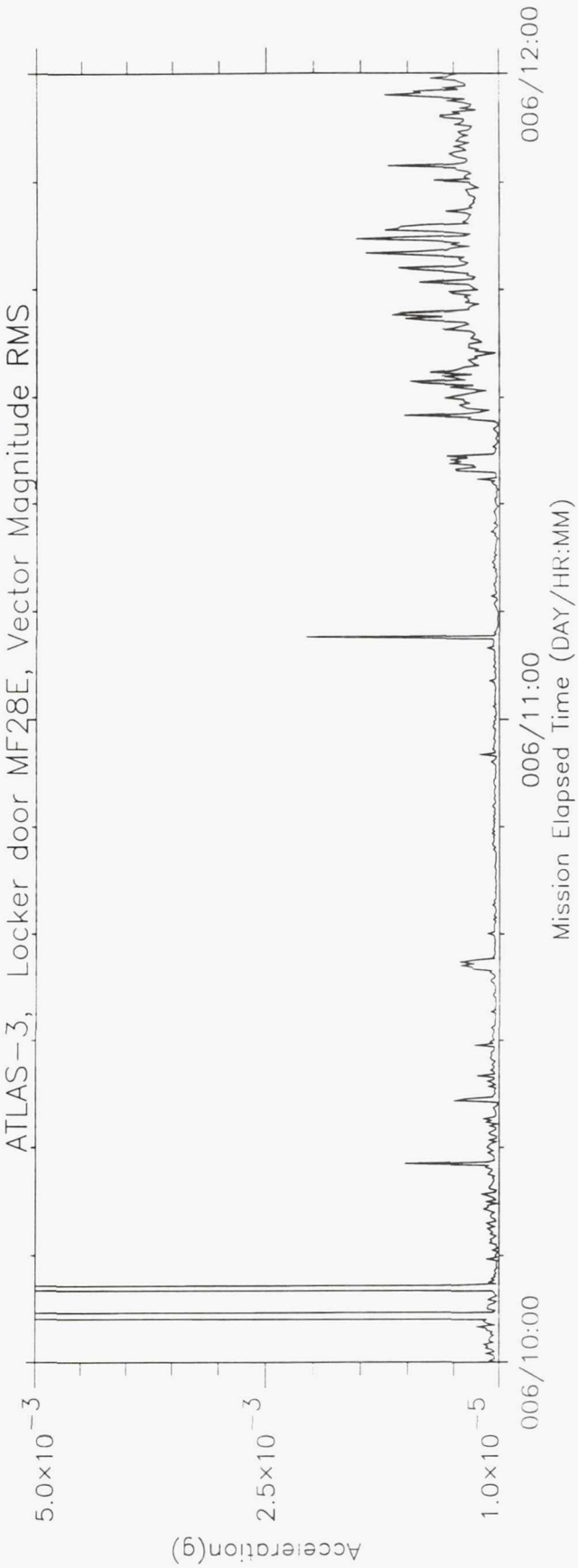
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10^-3
5×10^-4
1×10^-6
Acceleration(g)
006/10:00
006/11:00
006/12:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
2.5×10^-3
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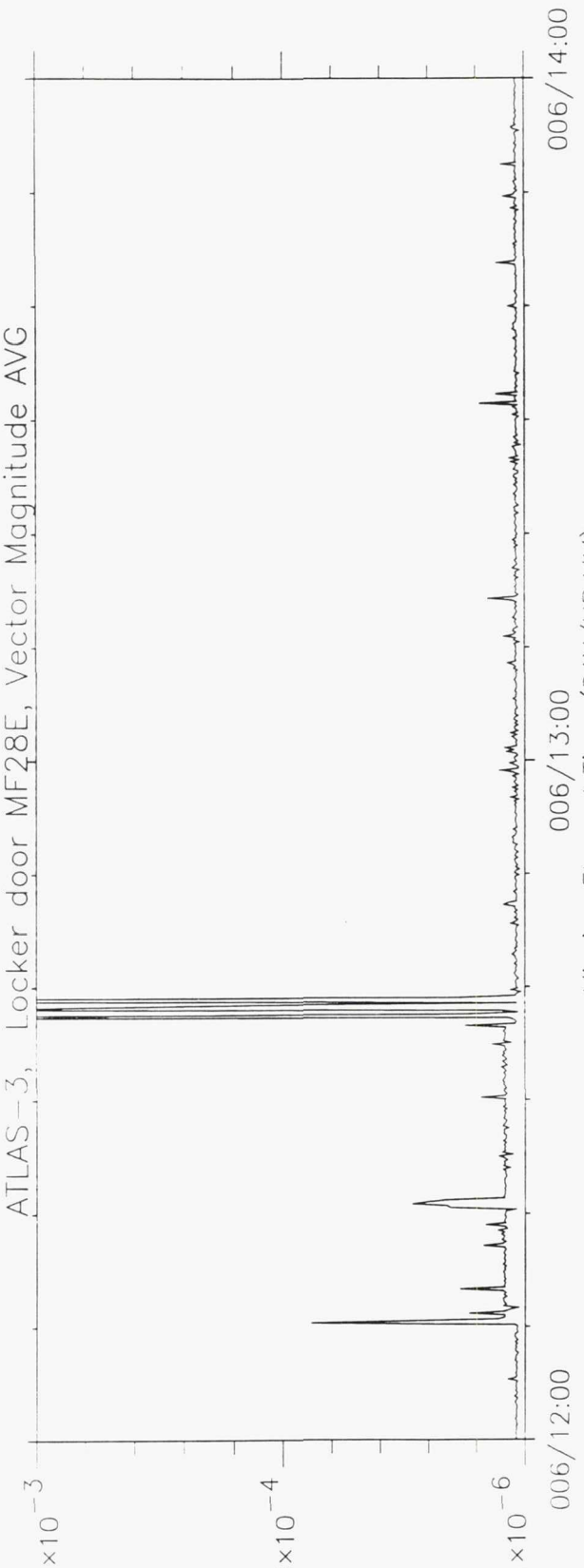
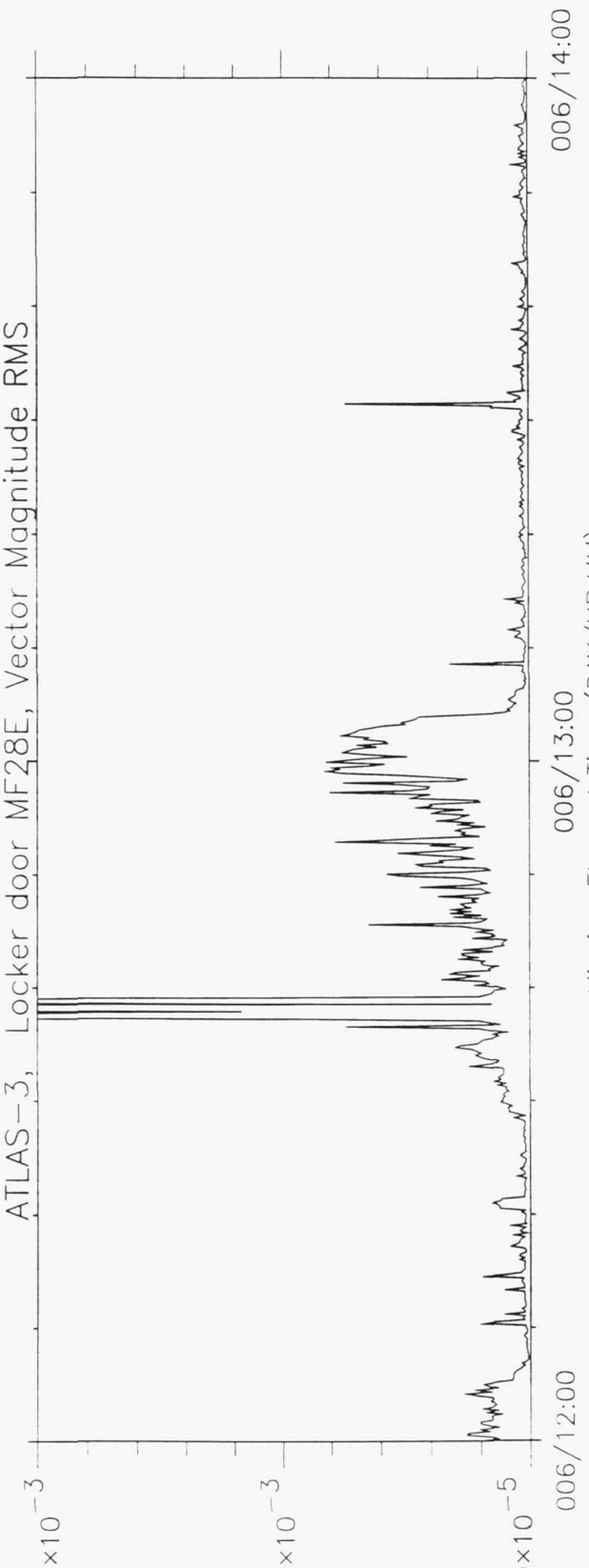
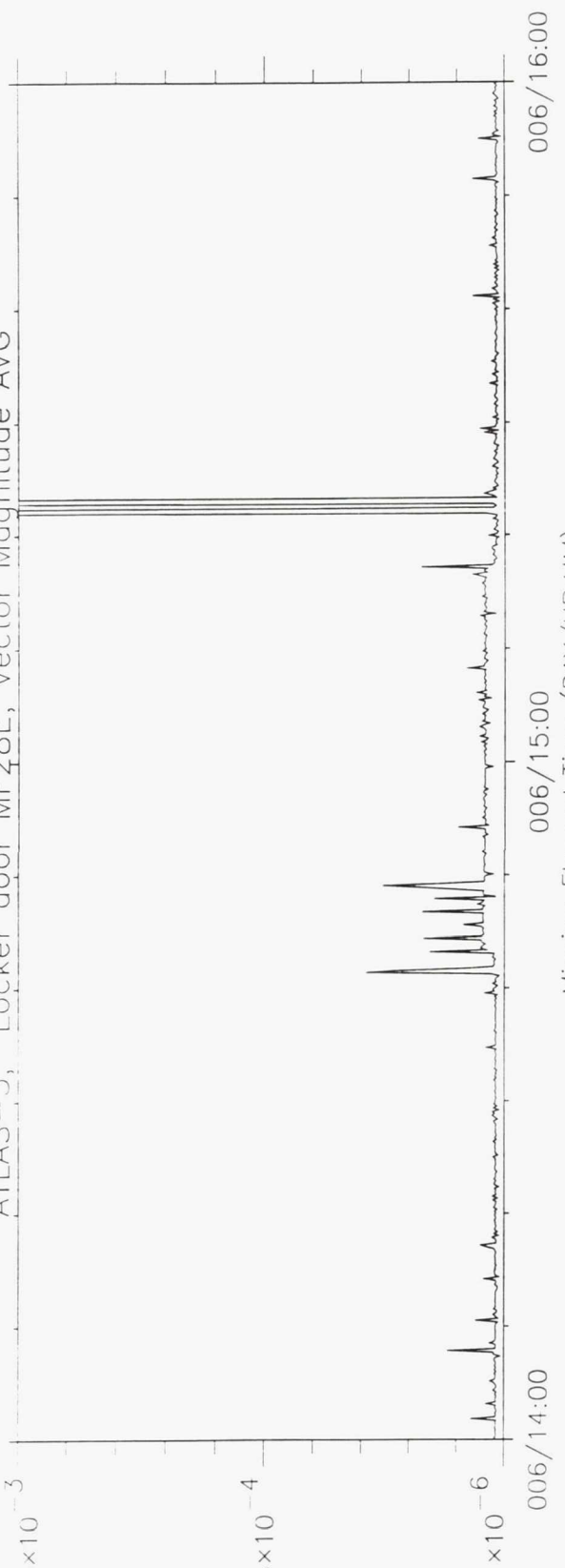
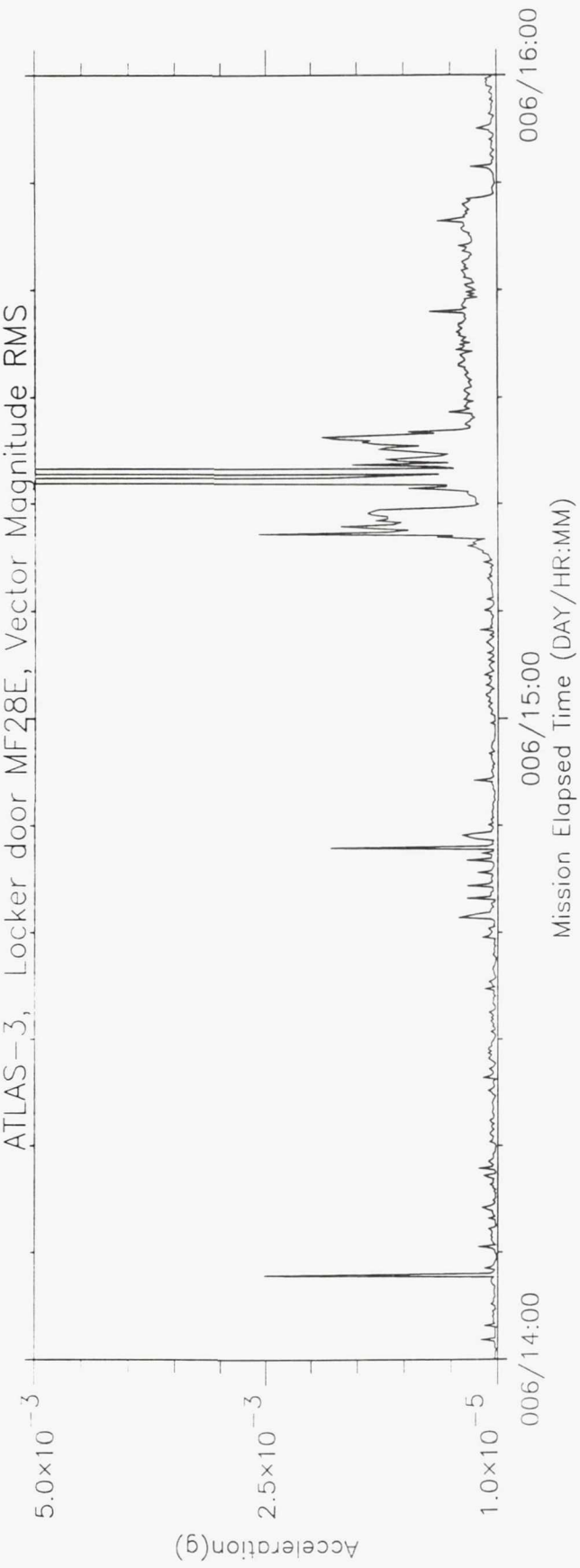
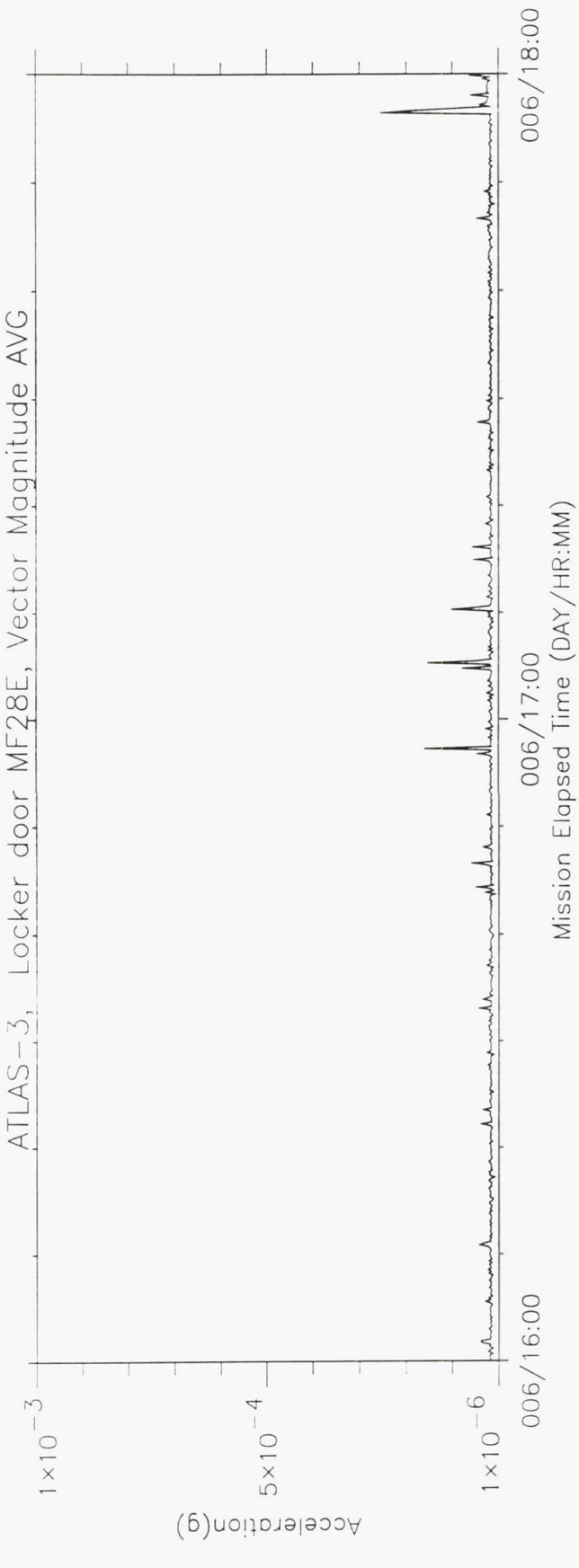
Acceleration(g)
006/10:00
006/11:00
006/12:00
Mission Elapsed Time (DAY/HR:MM)

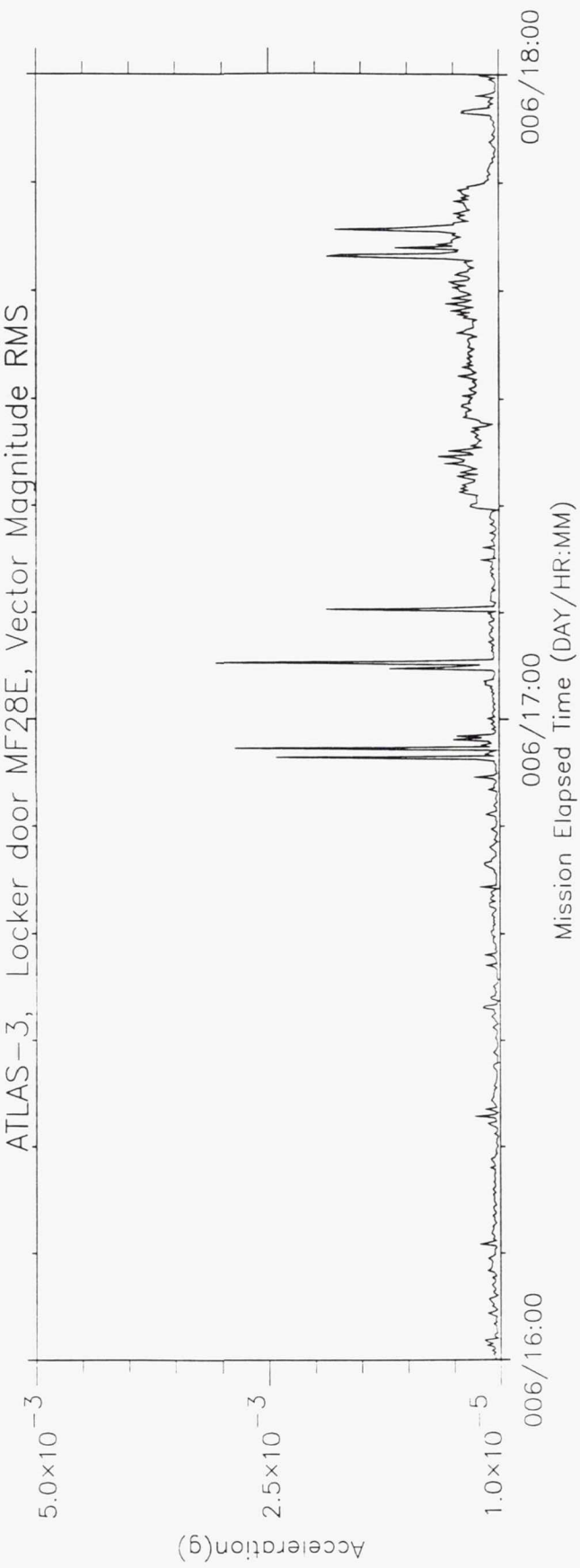

ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10^-3
5×10^-4
1×10^-6
Acceleration(g)
006/12:00
006/13:00
006/14:00
Mission Elapsed Time (DAY/HR:MM)

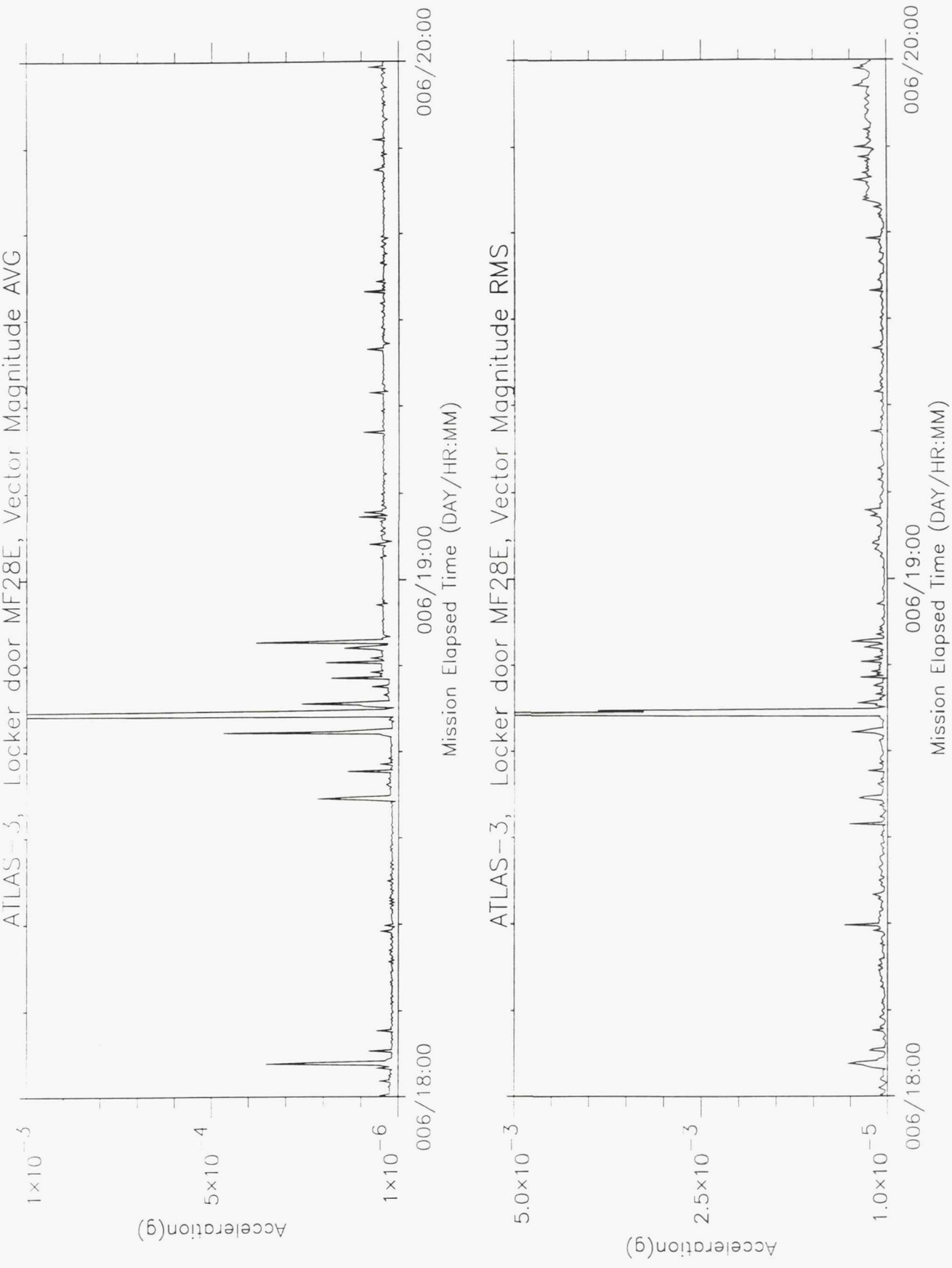

ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
2.5×10^-3
1.0×10^-5
Acceleration(g)
006/12:00
006/13:00
006/14:00
Mission Elapsed Time (DAY/HR:MM)

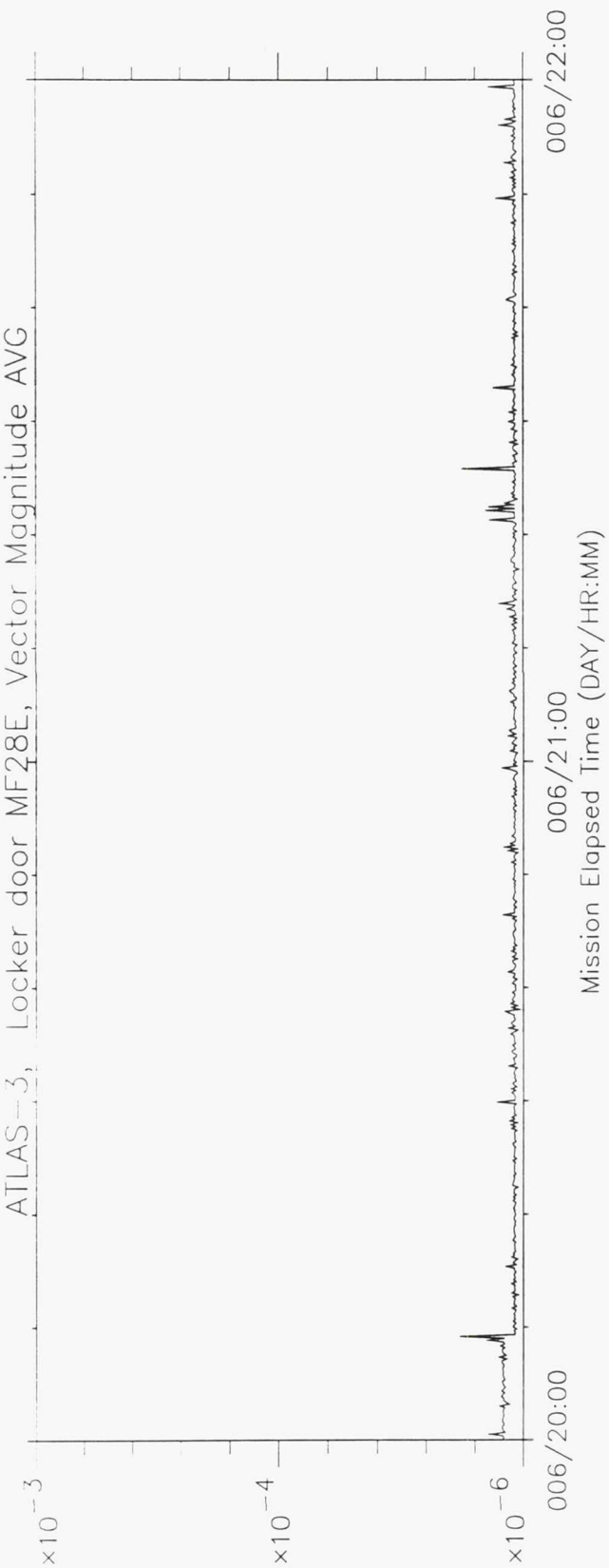

ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
1×10^-3
5×10^-4
1×10^-6
006/14:00
006/15:00
006/16:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10^-3
2.5×10^-3
1.0×10^-5
006/14:00
006/15:00
006/16:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10^-3
5×10^-4
1×10^-6
Acceleration(g)
006/16:00
006/17:00
006/18:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
2.5×10^-3
1.0×10^-5
Acceleration(g)
006/16:00
006/17:00
006/18:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
1×10⁻³
5×10⁻⁴
1×10⁻⁶
006/18:00
006/19:00
006/20:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
006/18:00
006/19:00
006/20:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10^-3
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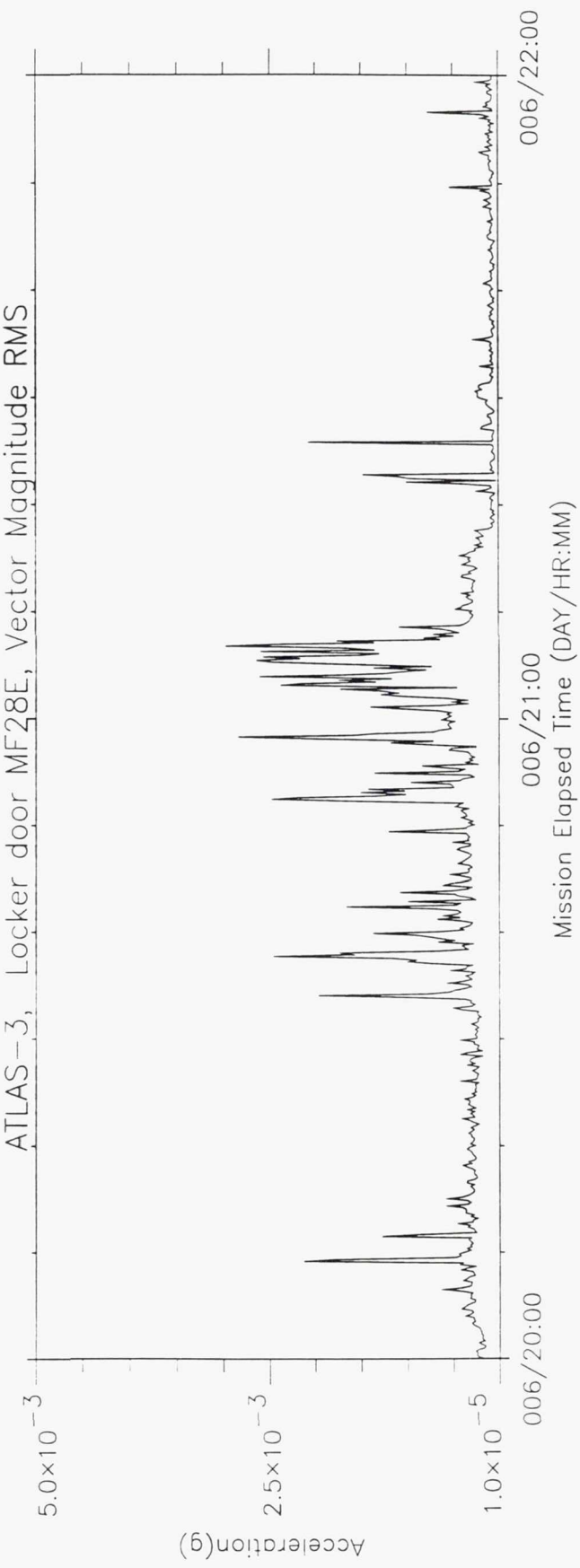
1×10^-6
Acceleration(g)
006/20:00
006/21:00
006/22:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
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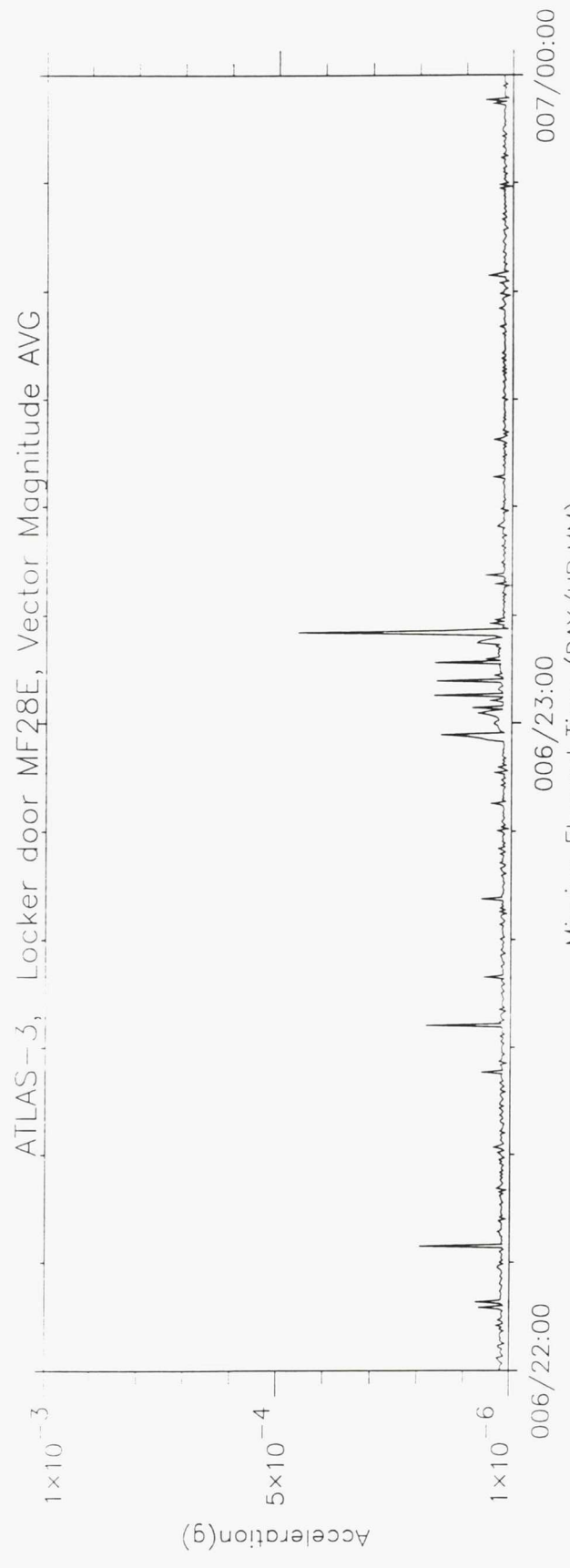
Acceleration(g)
006/20:00
006/21:00
006/22:00
Mission Elapsed Time (DAY/HR:MM)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Acceleration(g)
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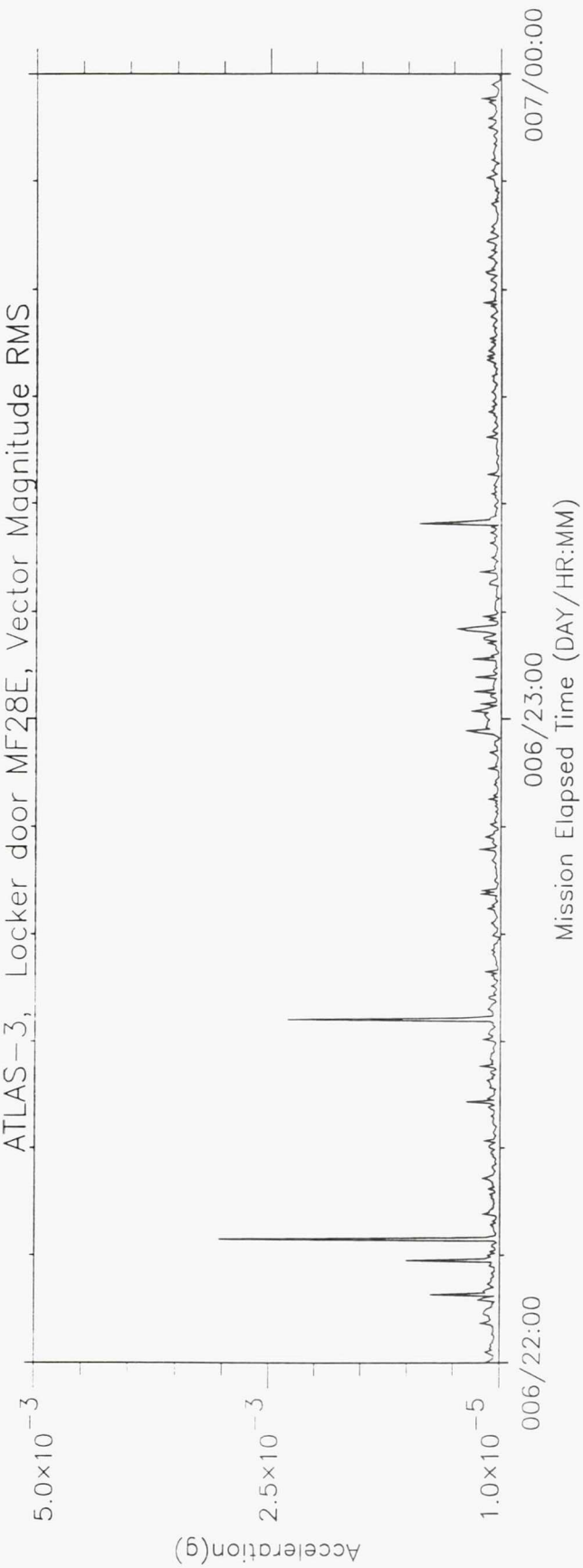
Mission Elapsed Time (DAY/HR:MM)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Acceleration(g)
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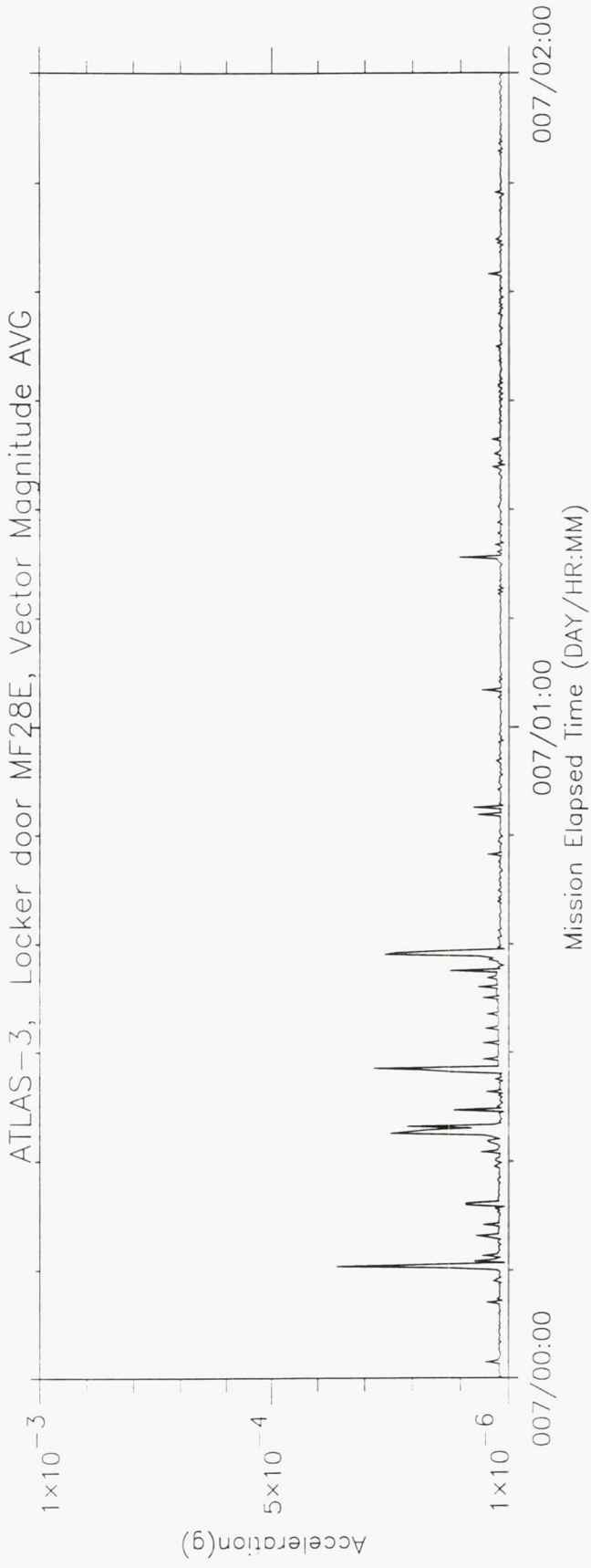
ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10⁻³
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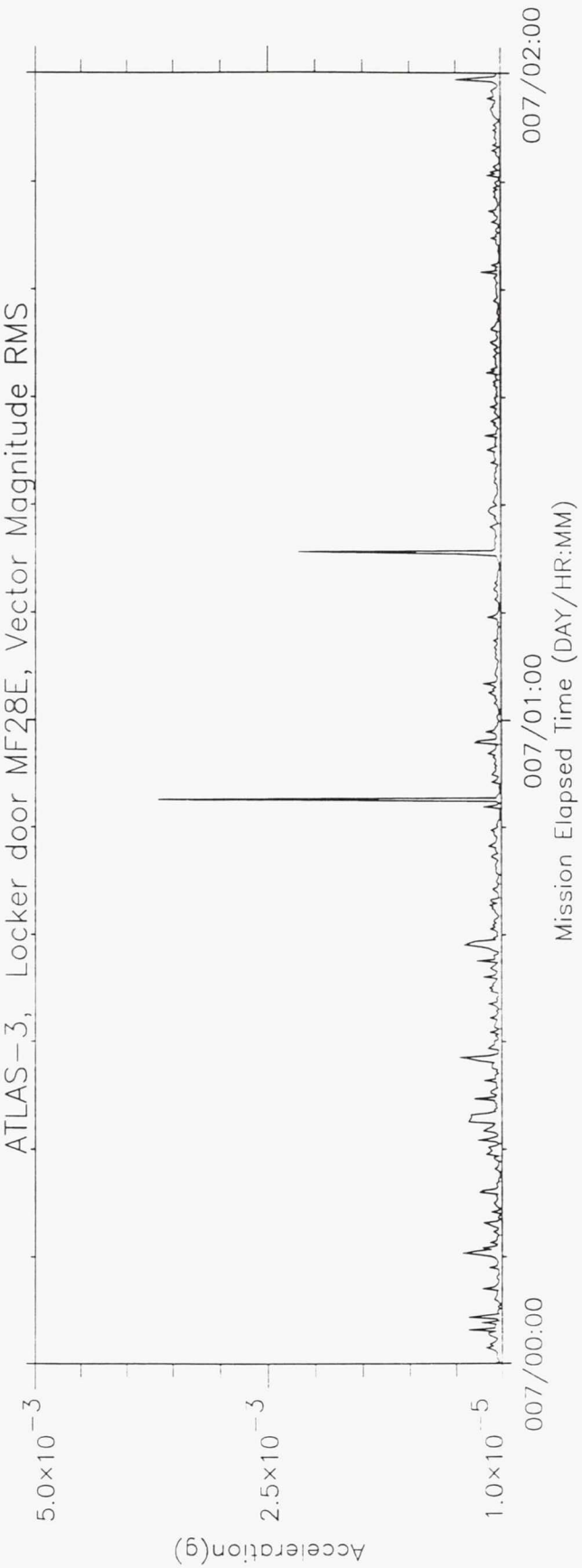
1×10⁻⁶
Acceleration(g)
007/00:00
007/01:00
007/02:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10⁻³
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Acceleration(g)
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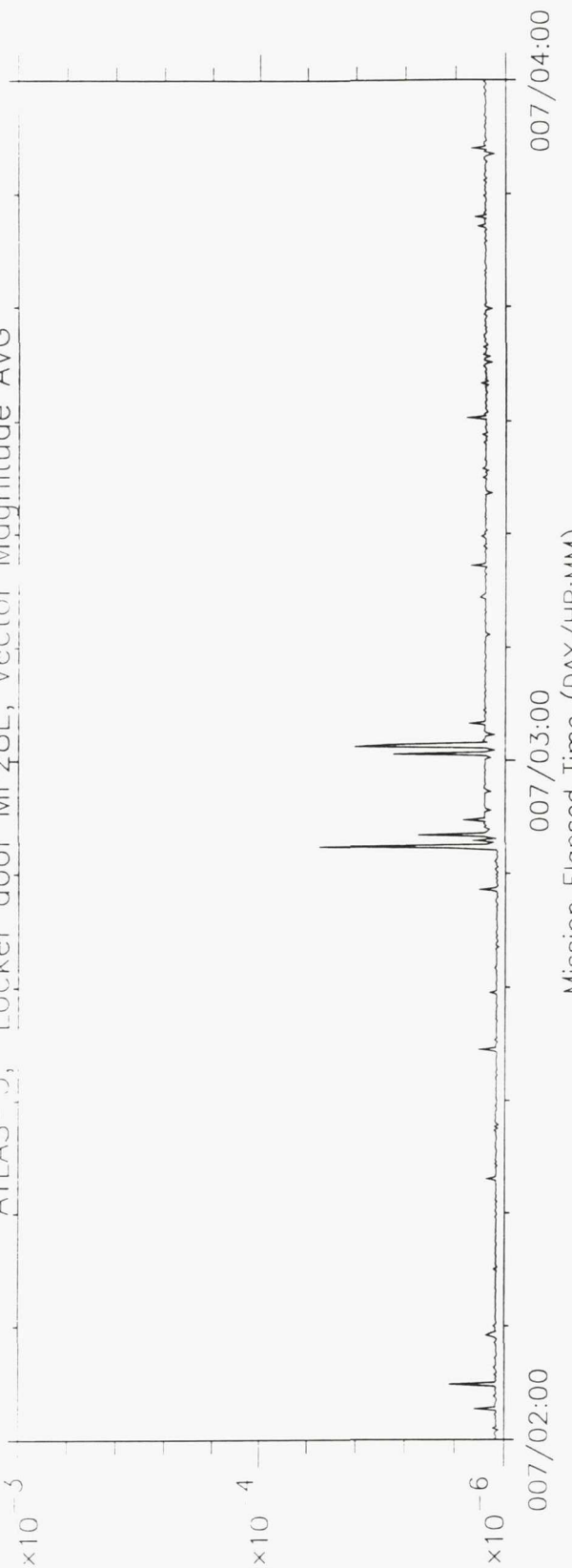
007/02:00
Mission Elapsed Time (DAY/HR:MM)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Acceleration(g)
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1×10⁻⁶
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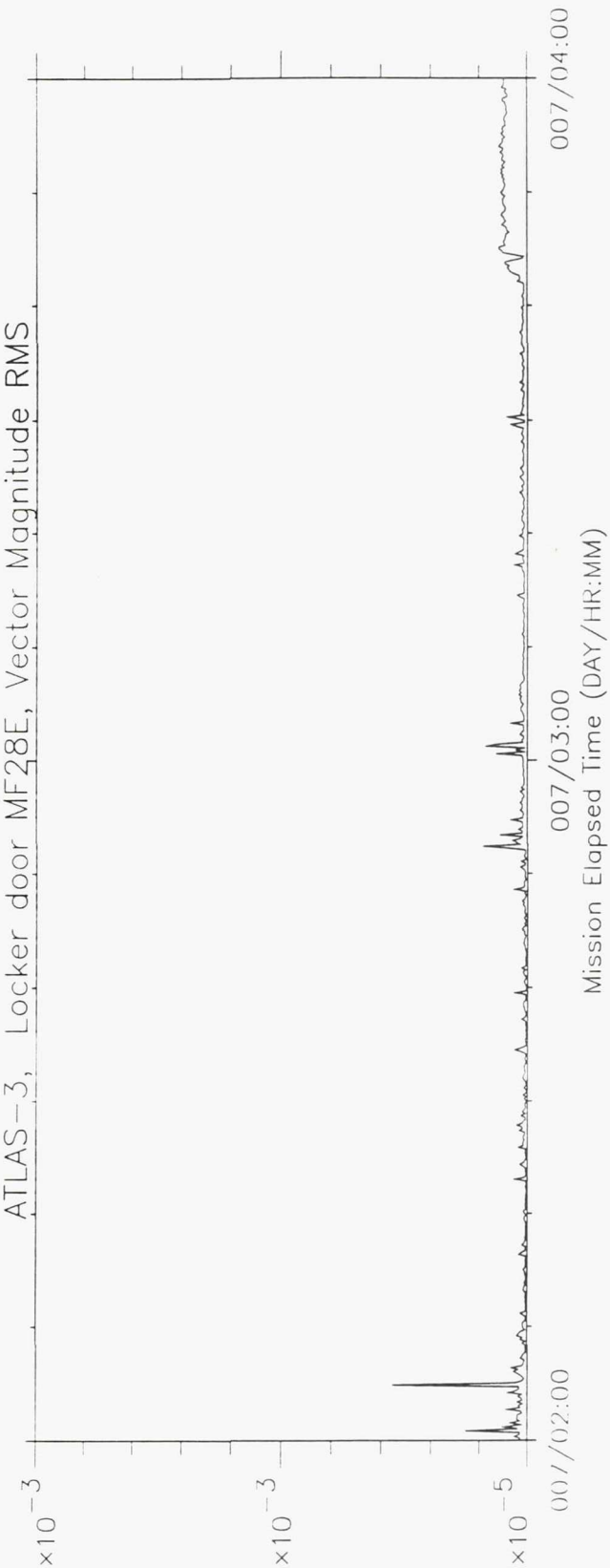
007/04:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
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2.5×10⁻³
1.0×10⁻⁵
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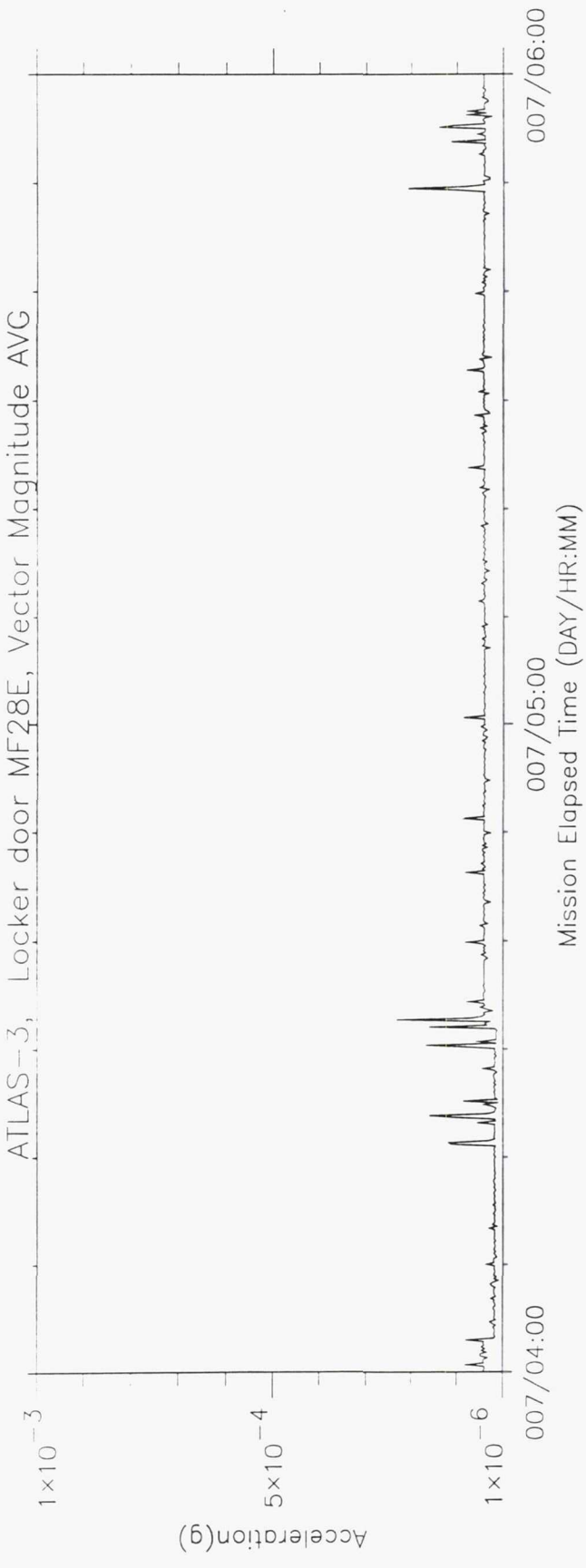
Mission Elapsed Time (DAY/HR:MM)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1×10^-6
Acceleration(g)
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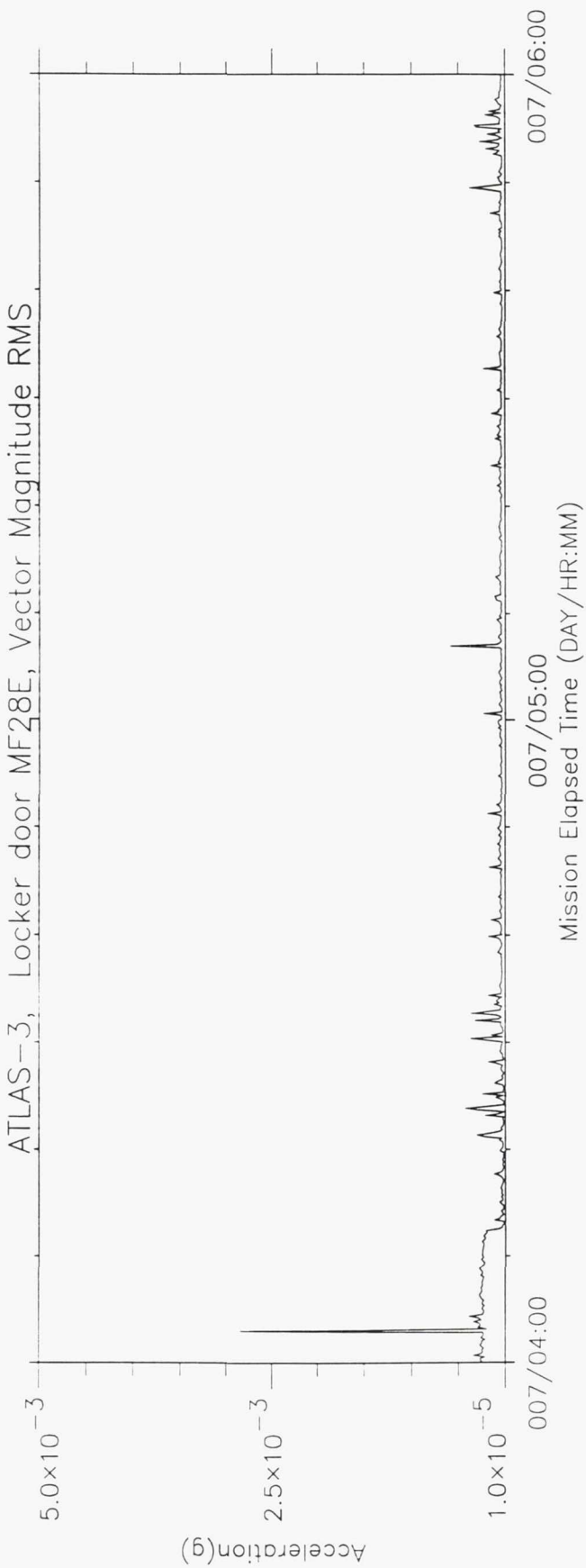
007/06:00
Mission Elapsed Time (DAY/HR:MM)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Acceleration(g)
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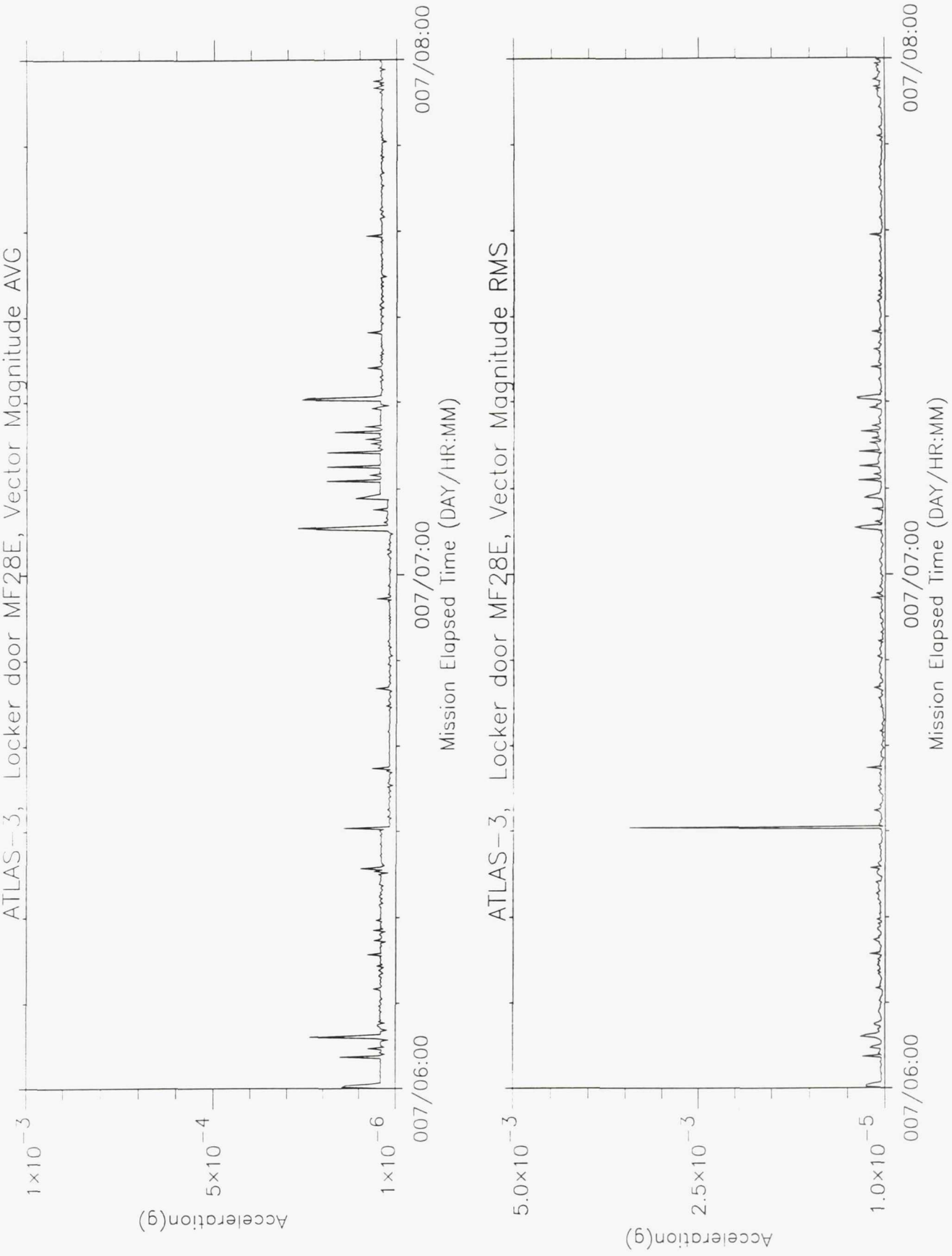
007/06:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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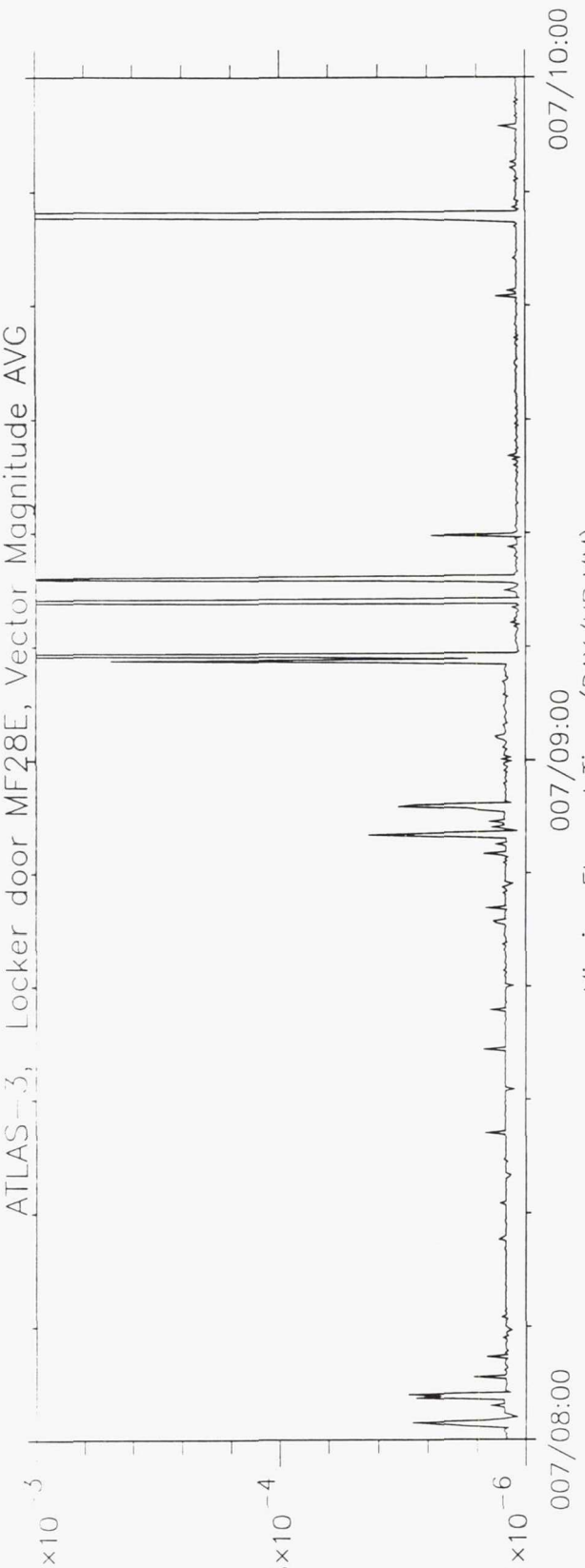
5×10^-4
1×10^-6
Acceleration(g)
007/06:00
007/07:00
007/08:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
2.5×10^-3
1.0×10^-5
Acceleration(g)
007/06:00
007/07:00
007/08:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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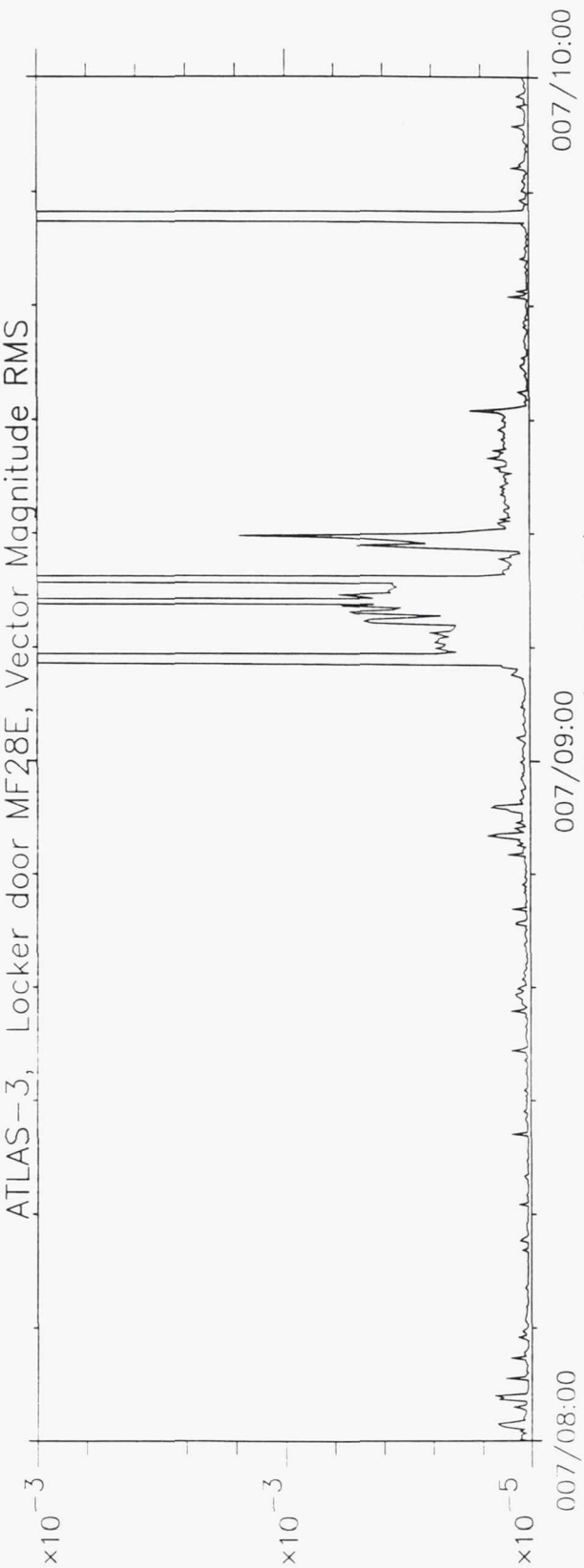
Acceleration(g)
007/08:00
007/09:00
007/10:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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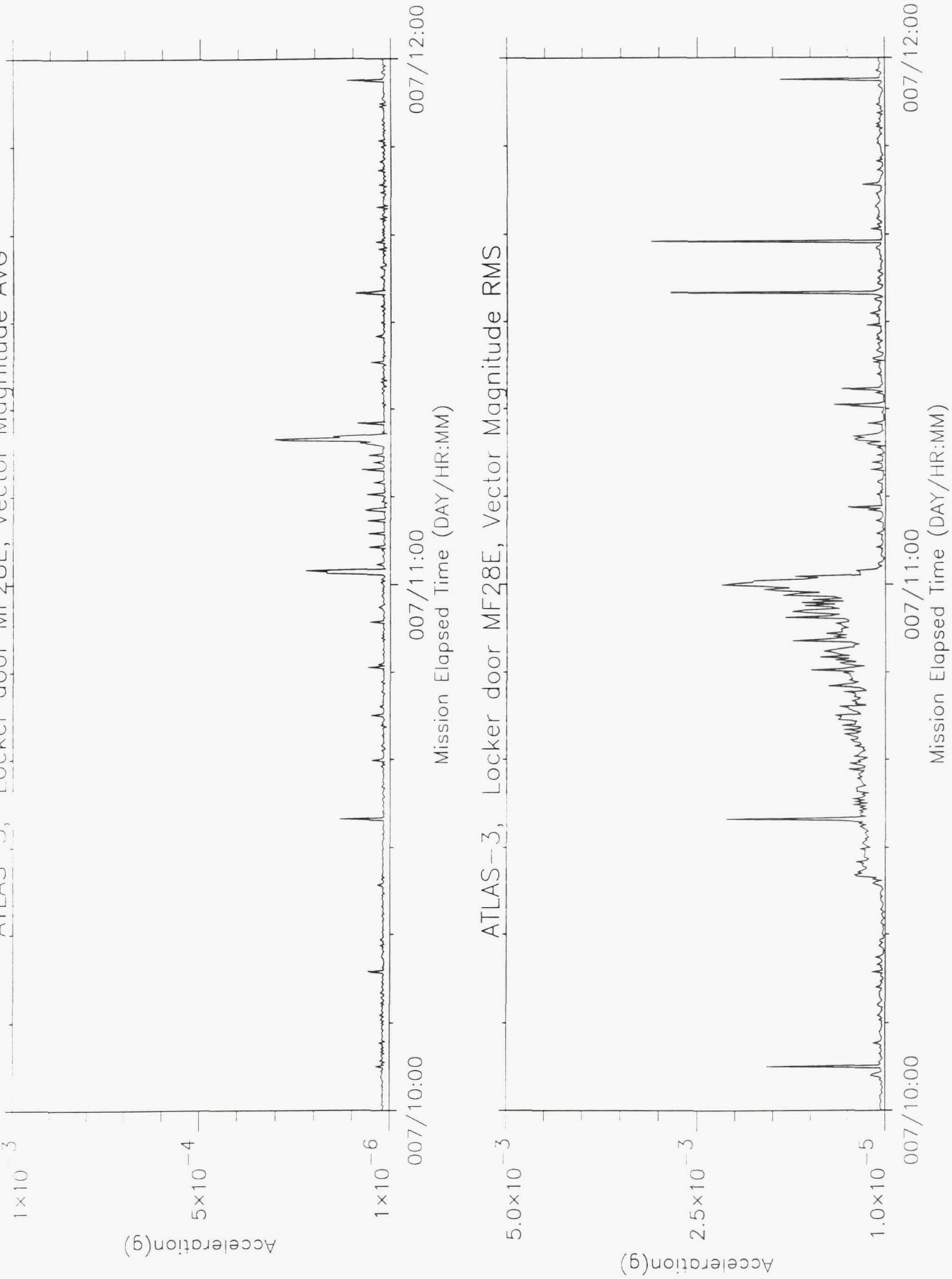
Acceleration(g)
007/08:00
007/09:00
007/10:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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5×10^-4
1×10^-6
Acceleration(g)
007/10:00
007/11:00
007/12:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
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Acceleration(g)
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007/12:00
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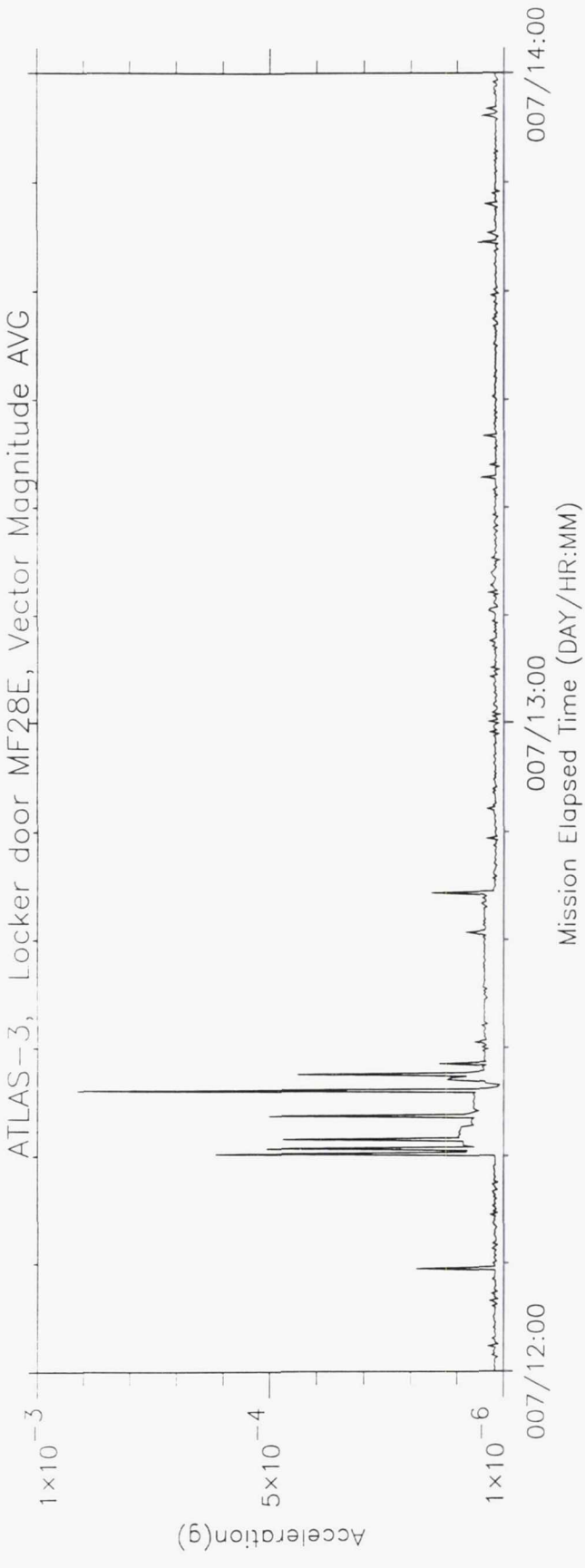
ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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Acceleration(g)
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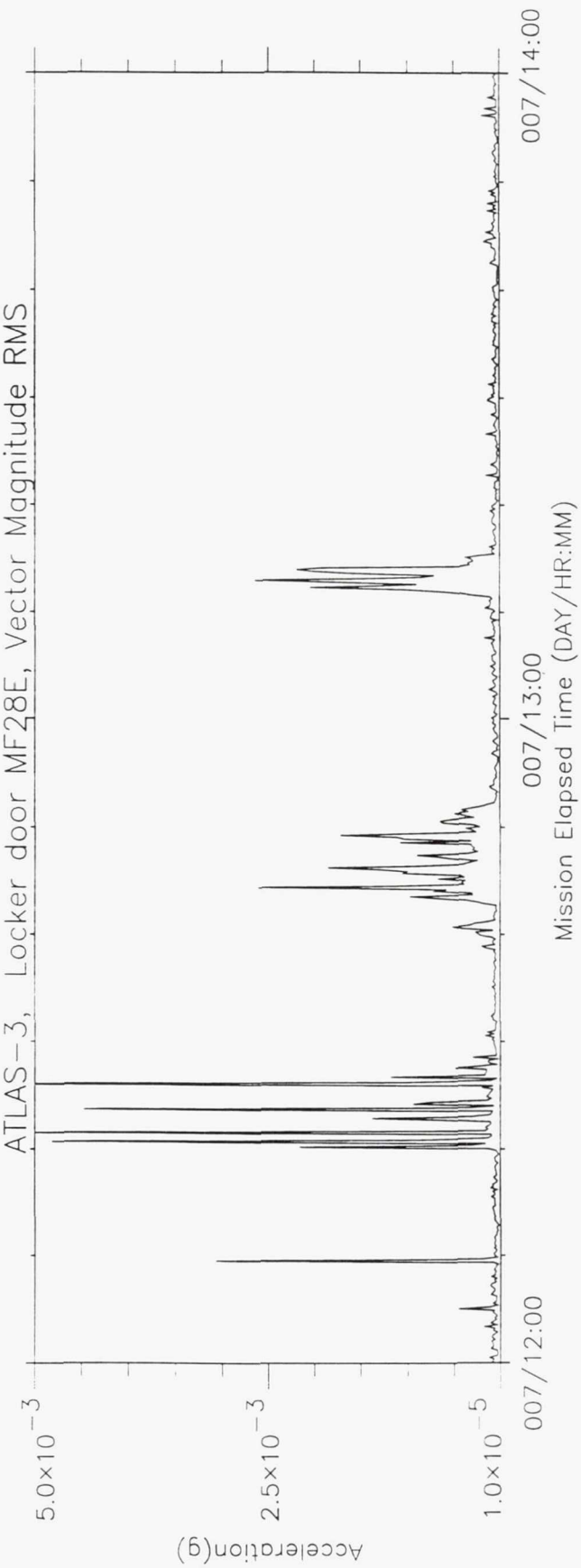
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Acceleration(g)
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007/14:00
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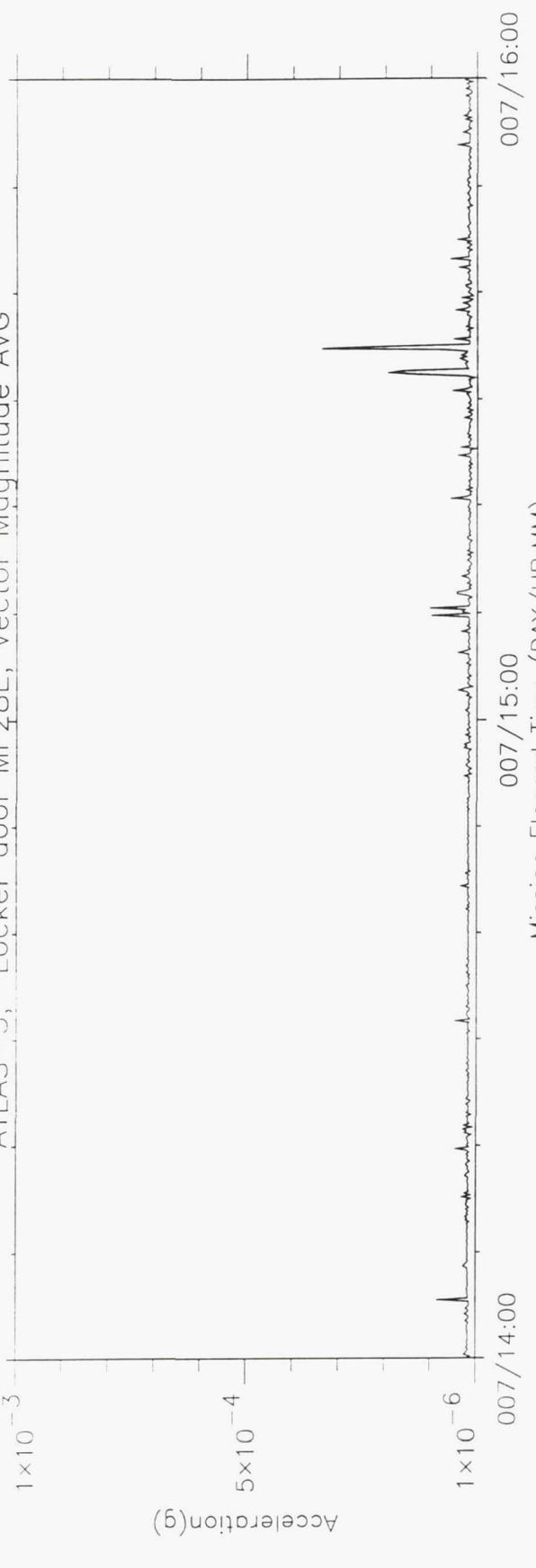
ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
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1×10⁻⁶
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007/15:00
007/16:00
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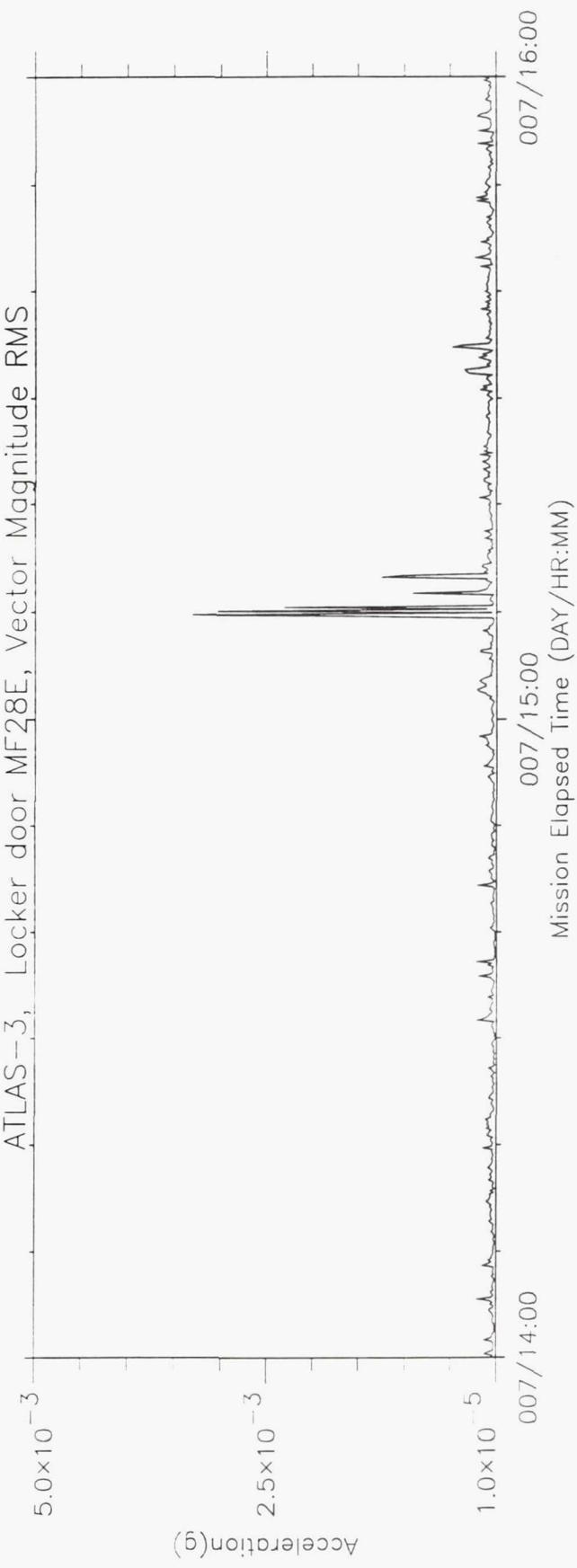
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
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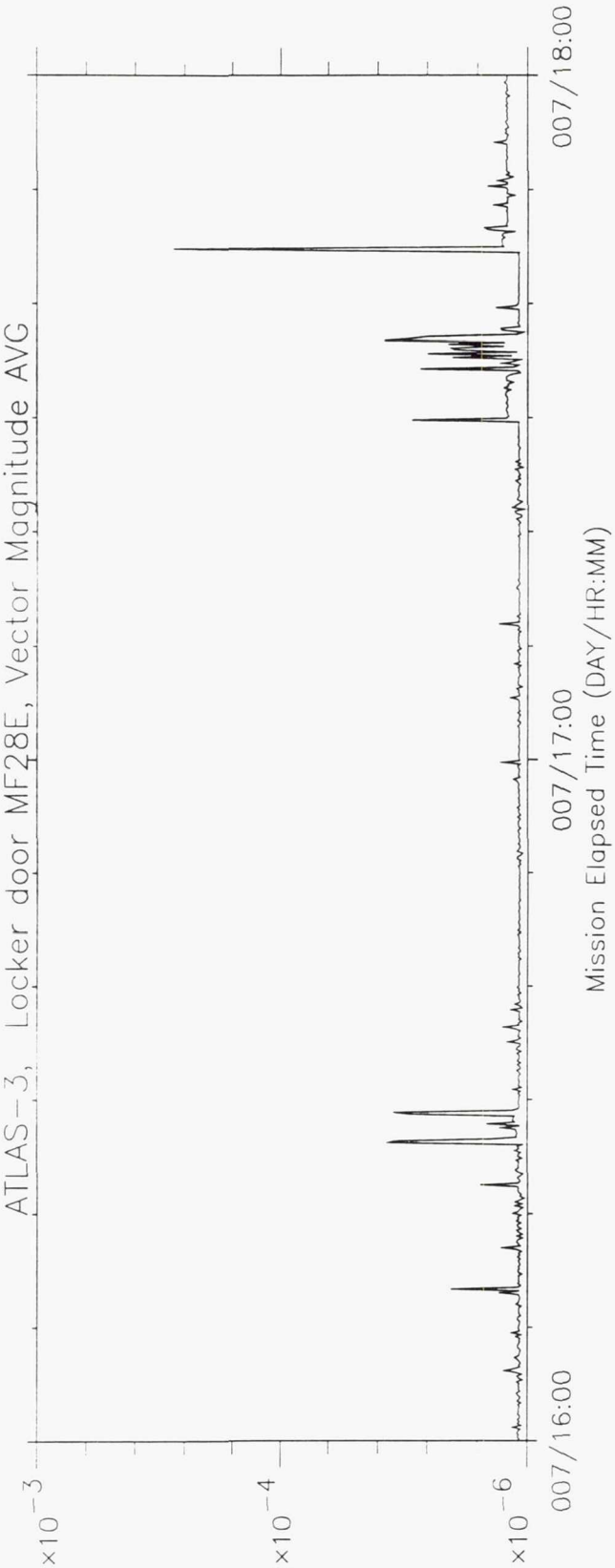
ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10⁻³
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Acceleration(g)
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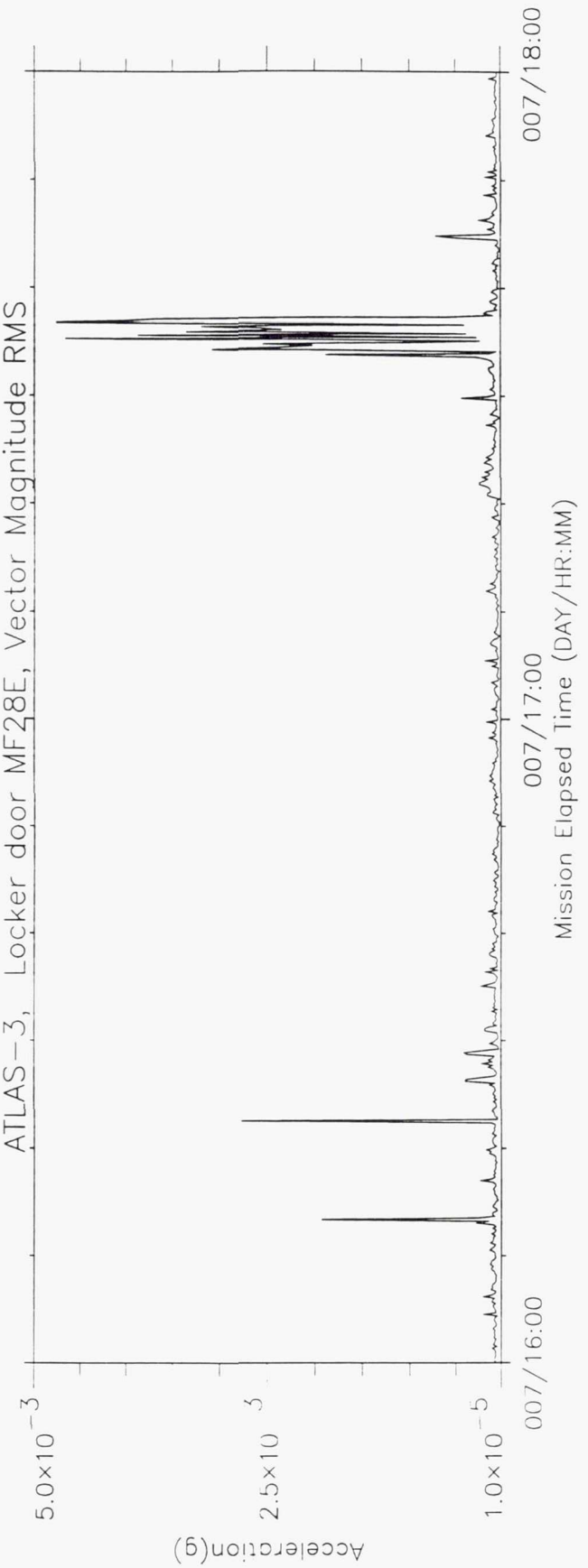
007/18:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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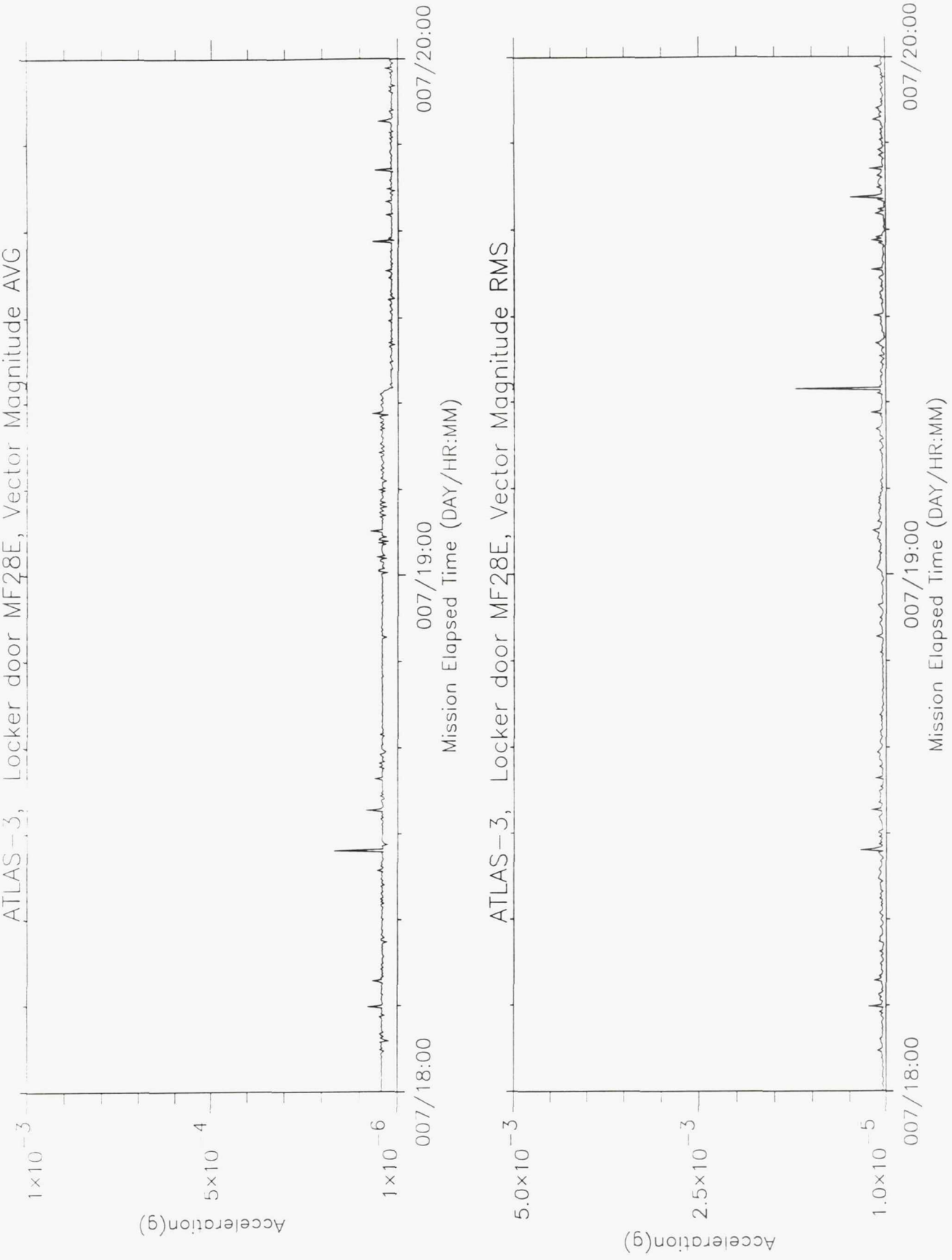
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Acceleration(g)
007/18:00
007/19:00
007/20:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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Acceleration(g)
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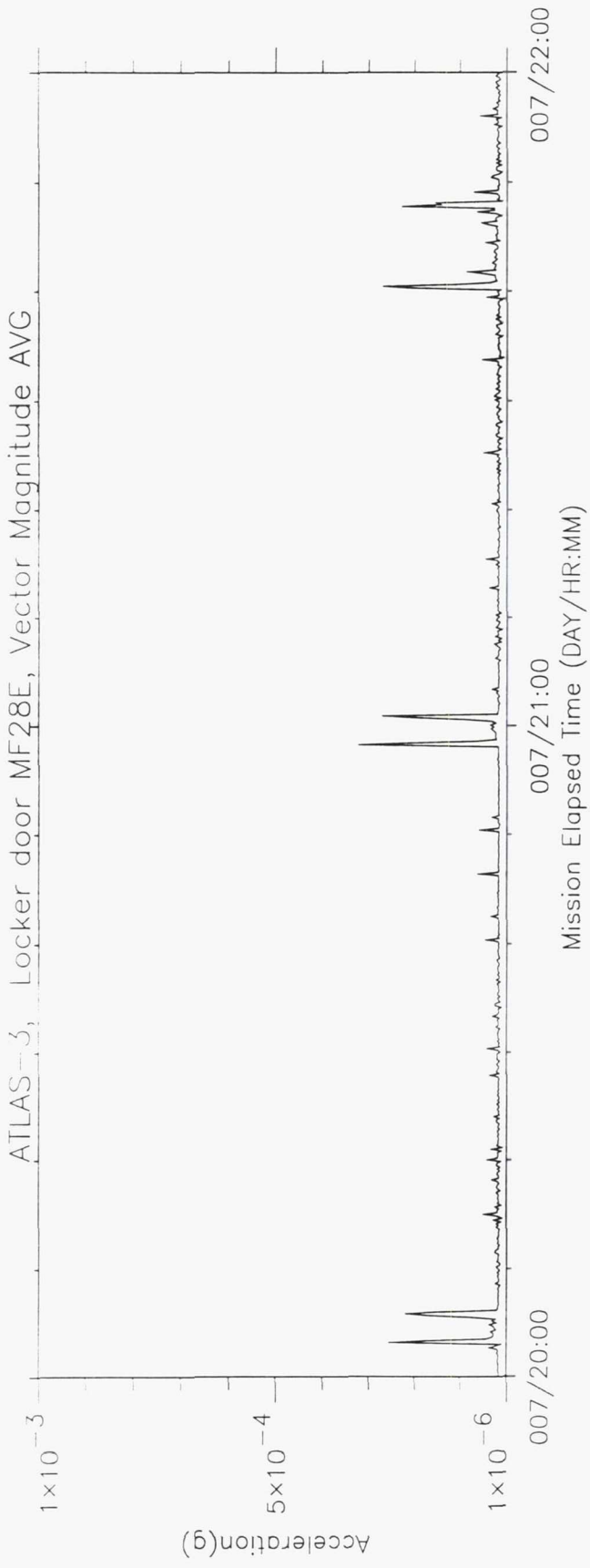
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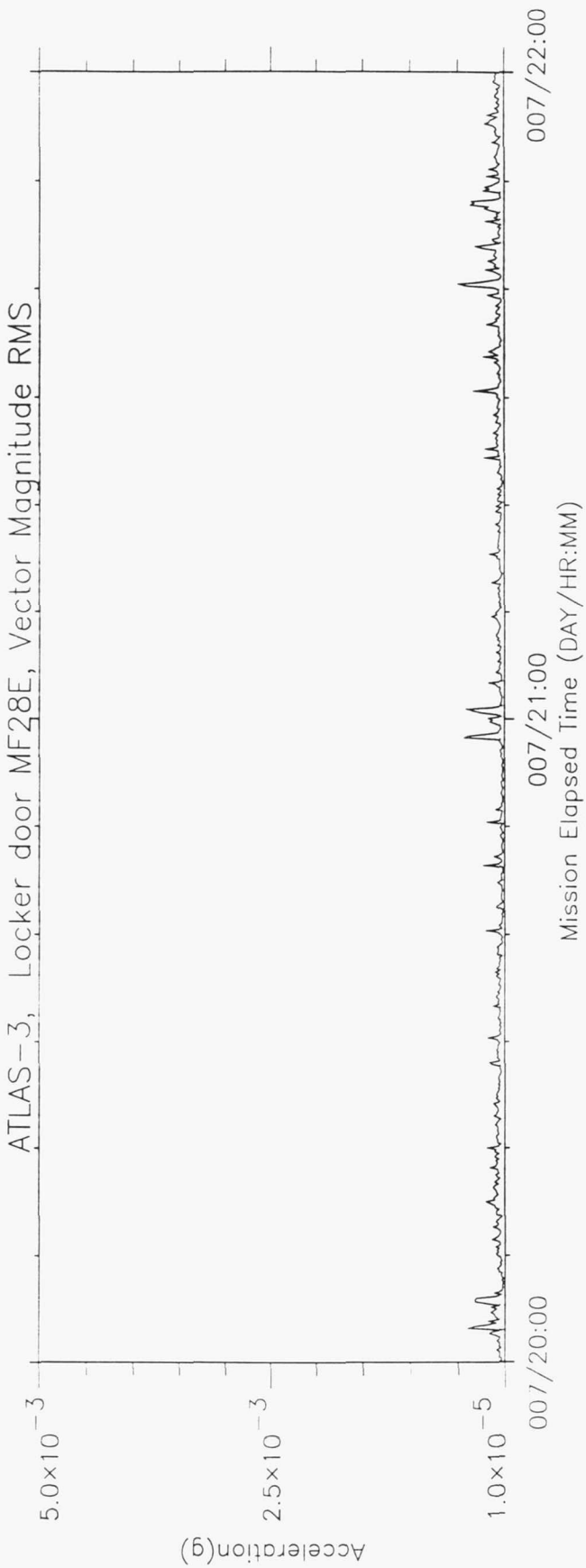
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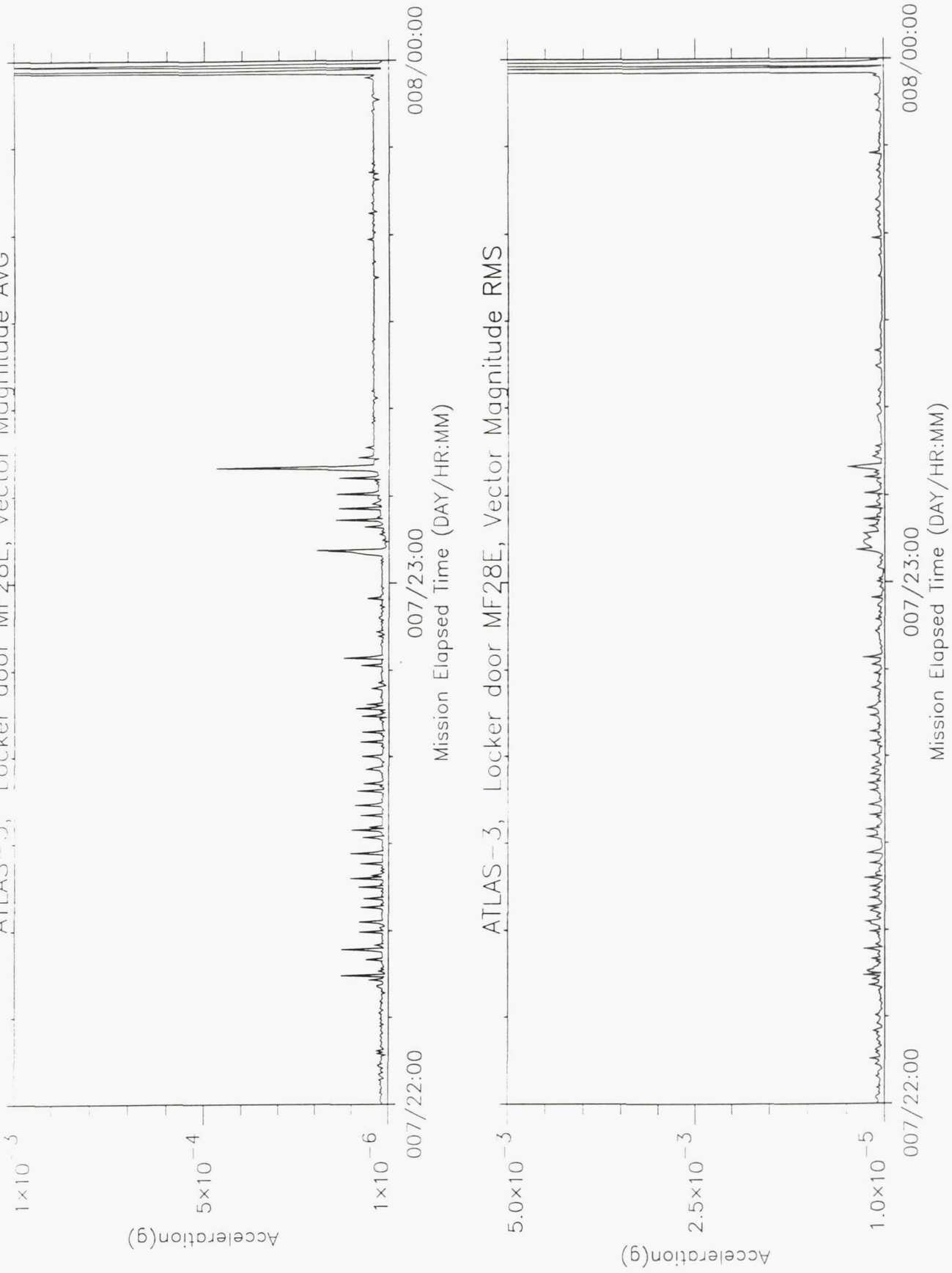
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Acceleration(g)
007/22:00
007/23:00
008/00:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
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Acceleration(g)
007/22:00
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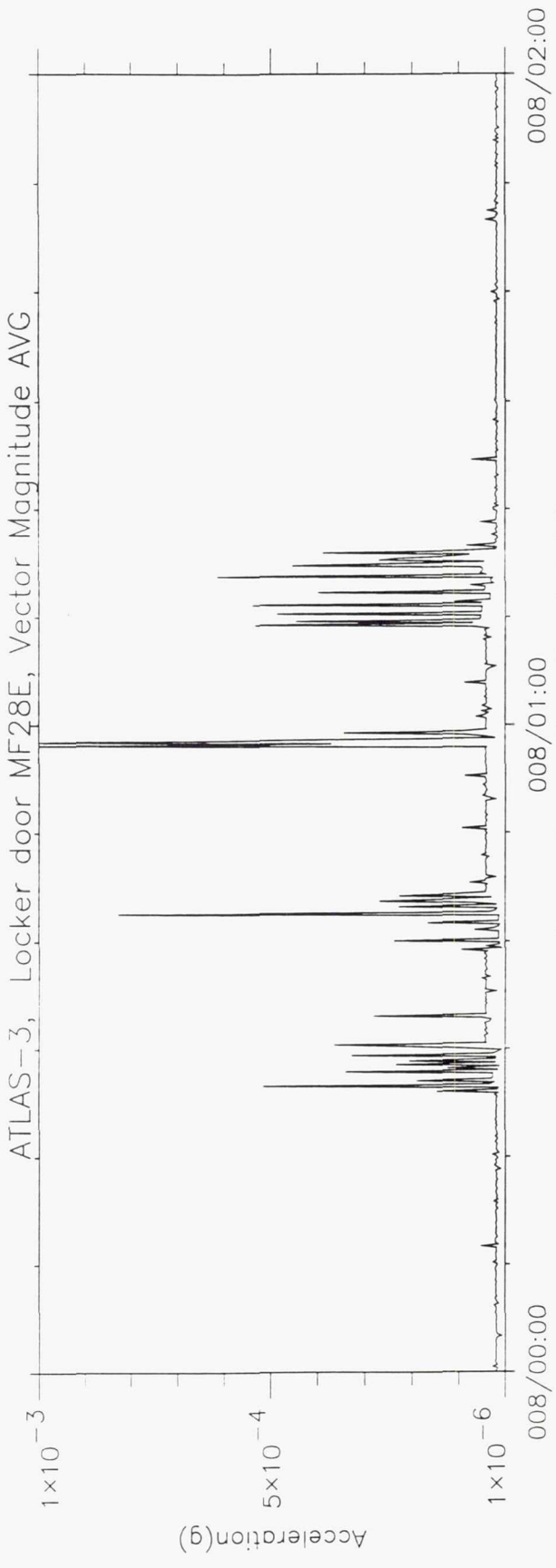
Mission Elapsed Time (DAY/HR:MM)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Acceleration(g)
008/00:00
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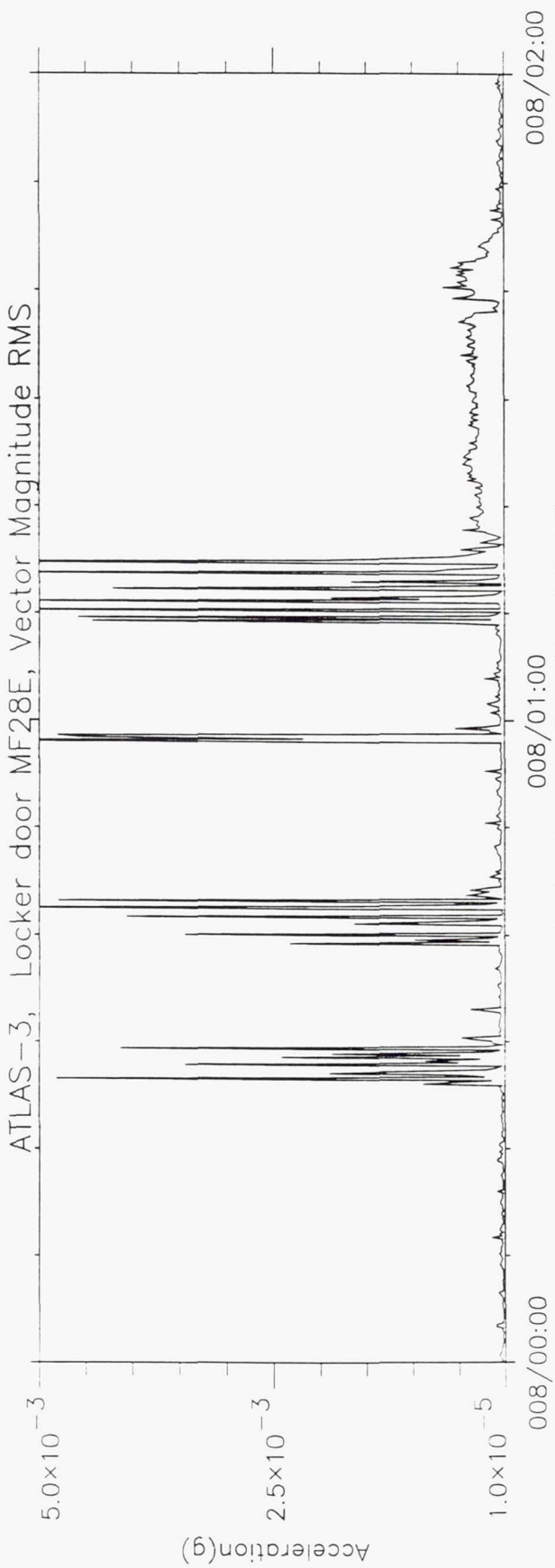
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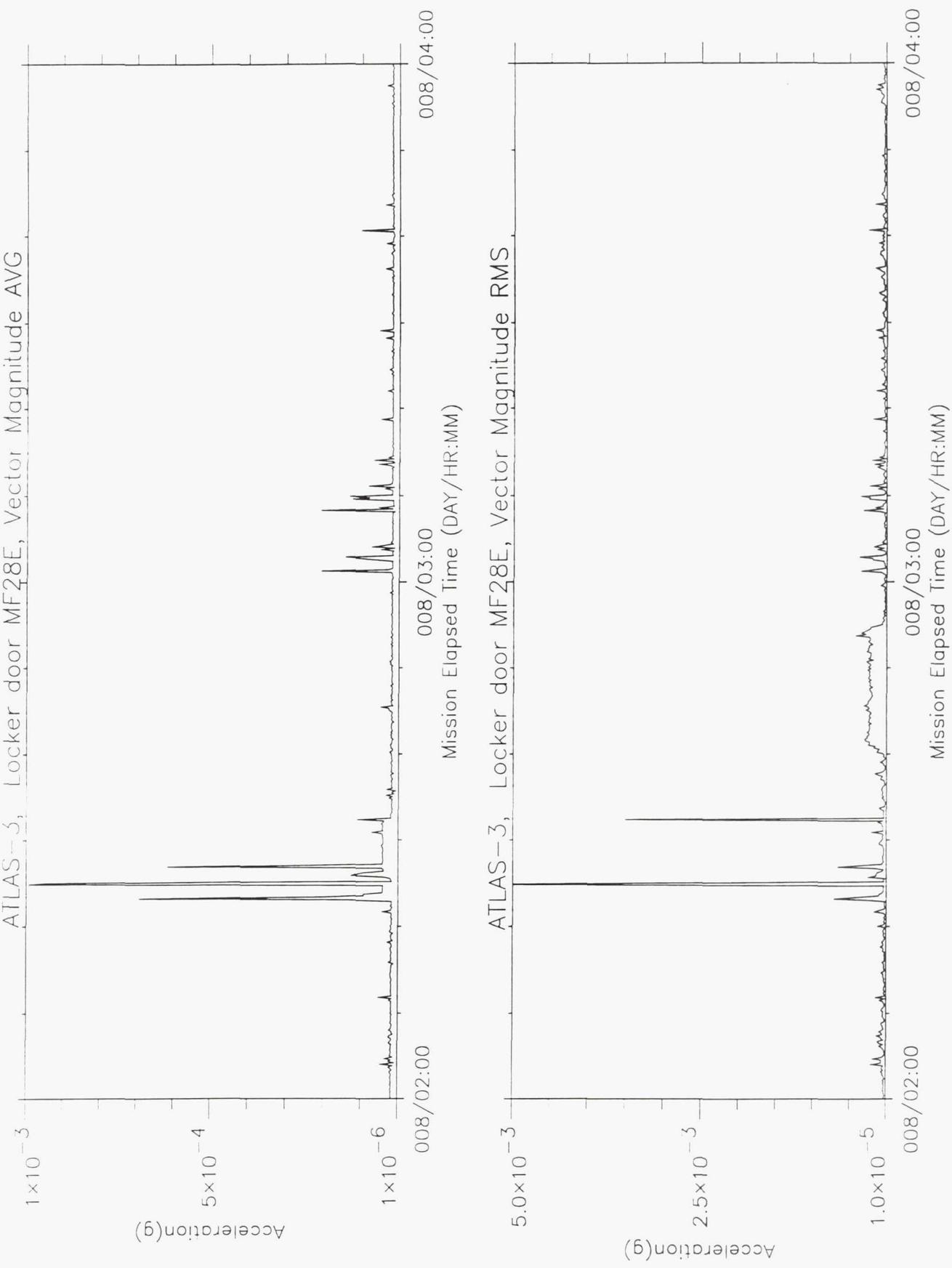
ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
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1×10⁻⁶
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008/03:00
008/04:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
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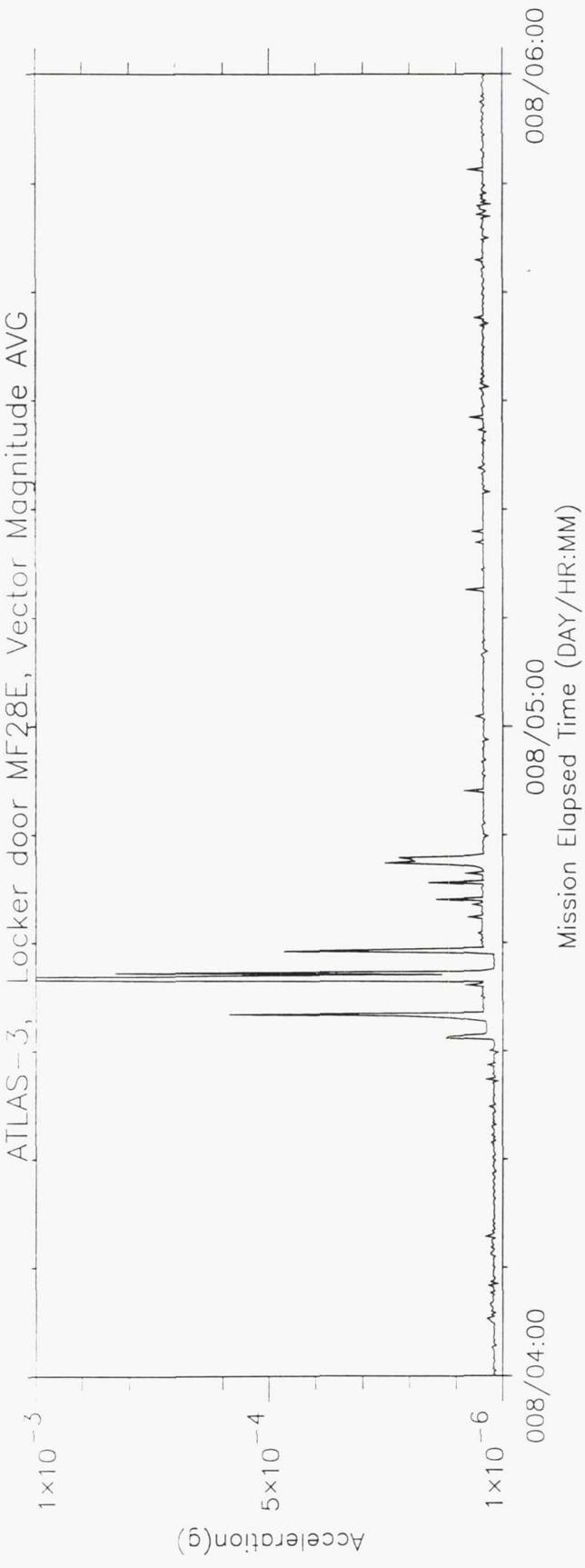
ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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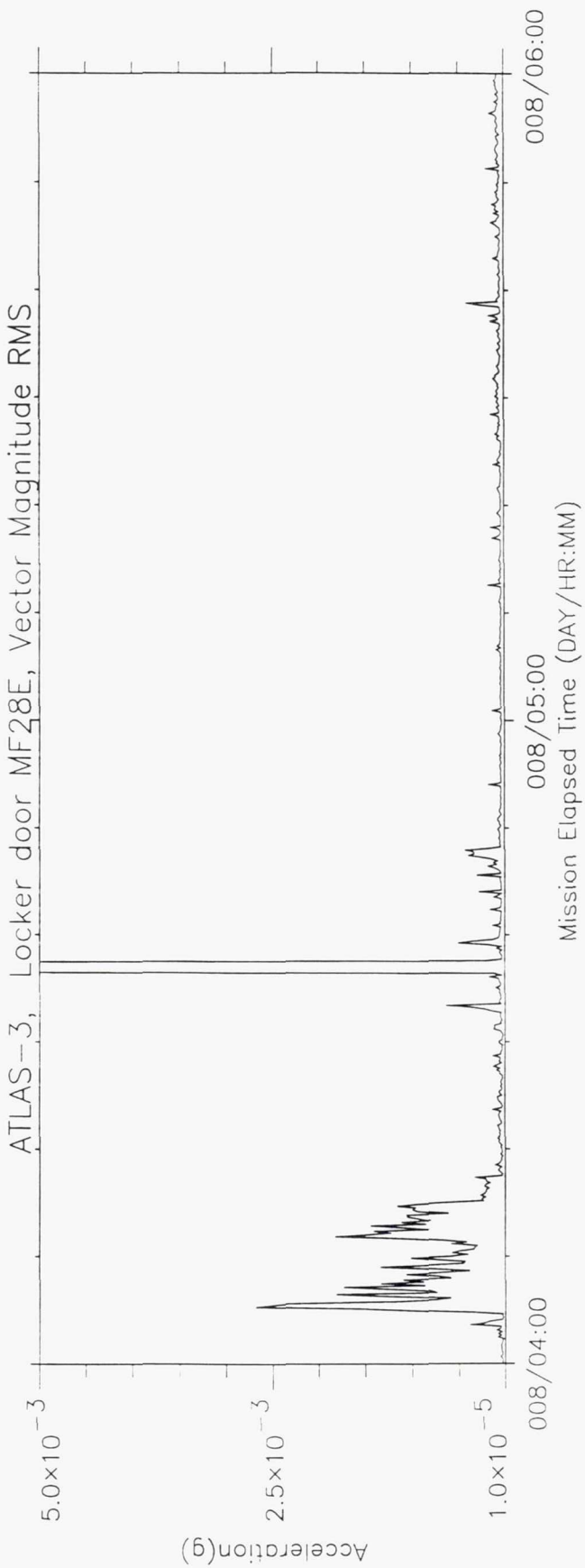
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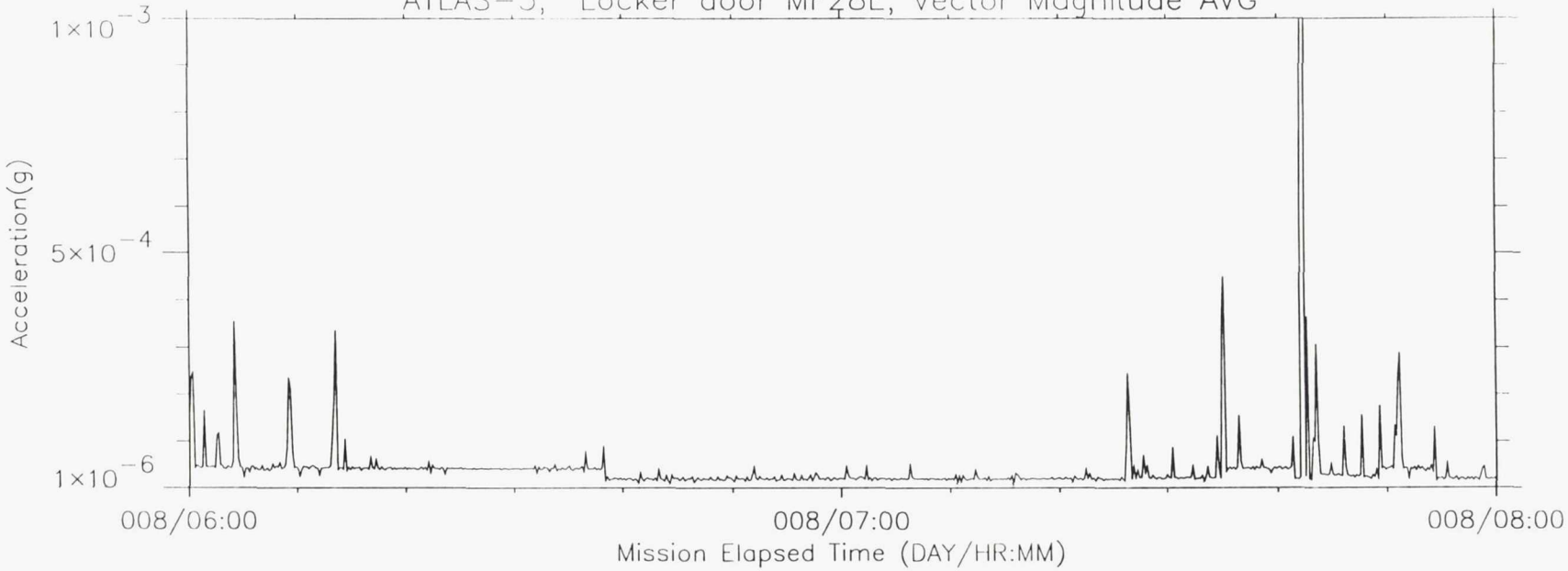
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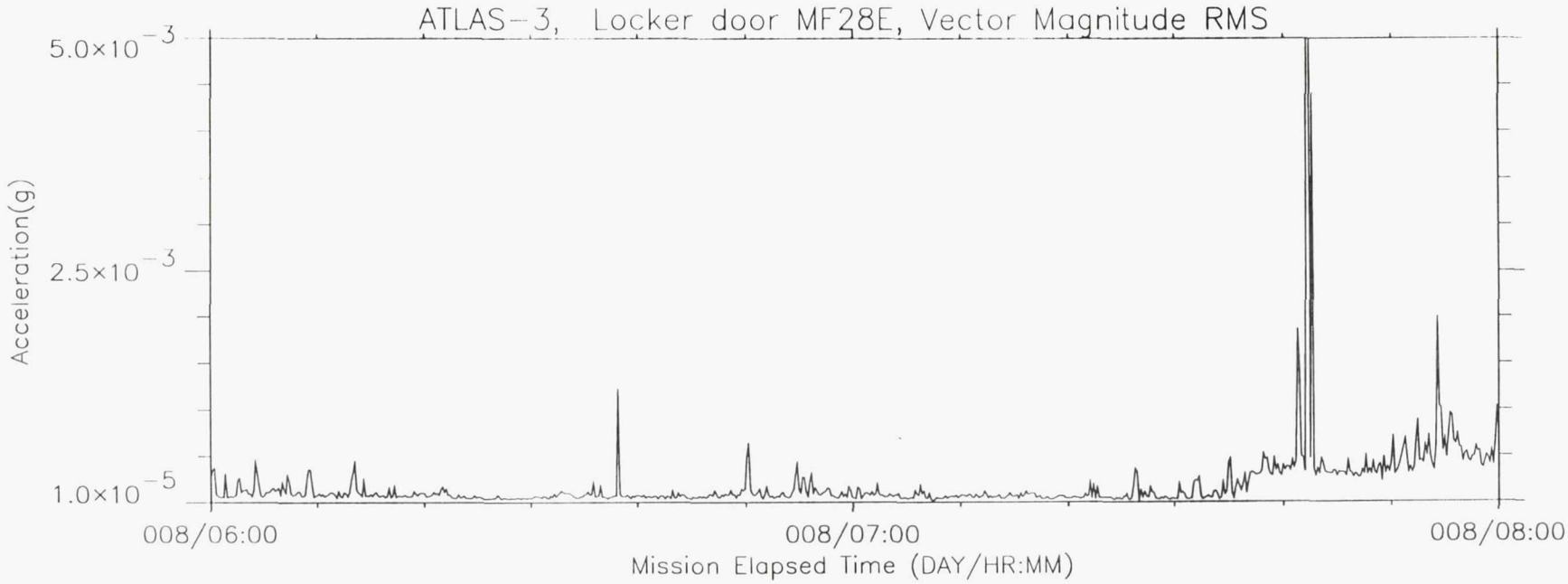
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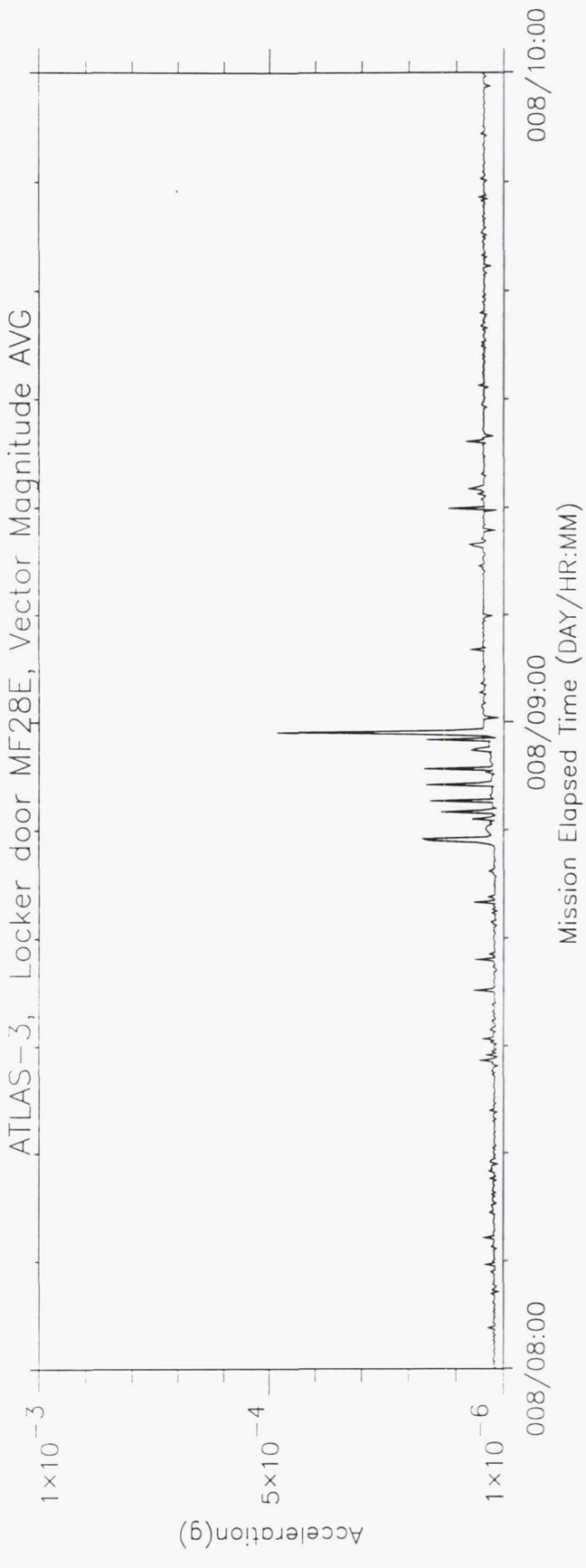
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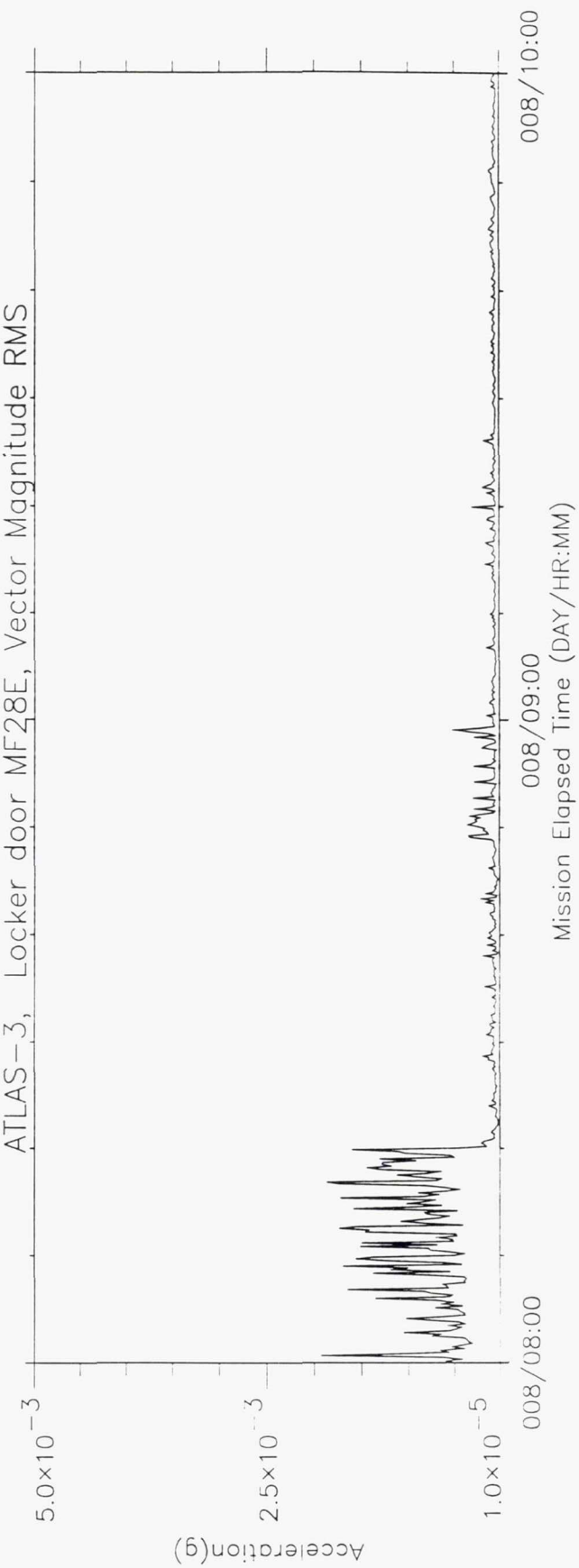
Acceleration(g)
008/08:00
008/09:00
008/10:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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Acceleration(g)
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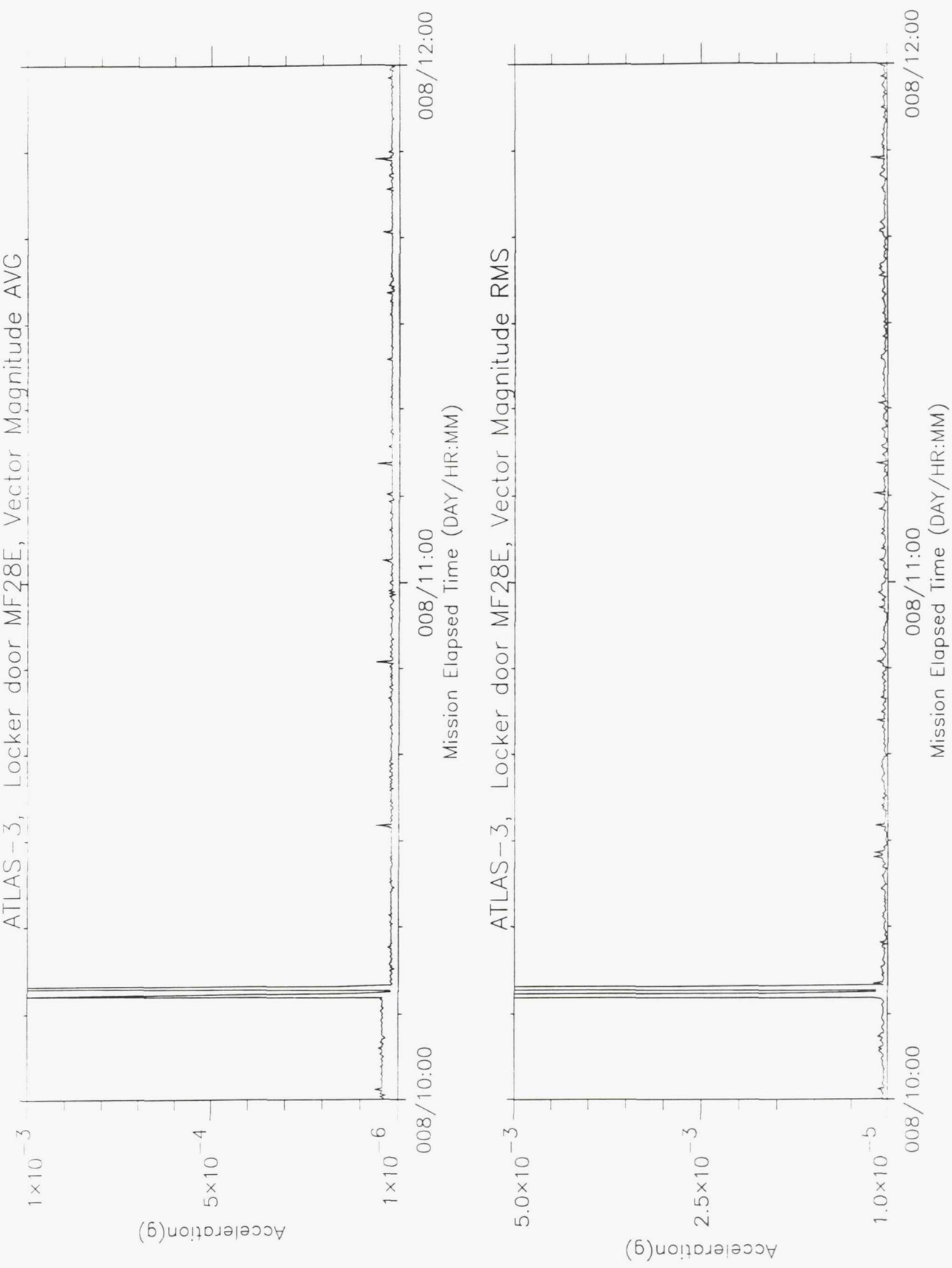
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008/12:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
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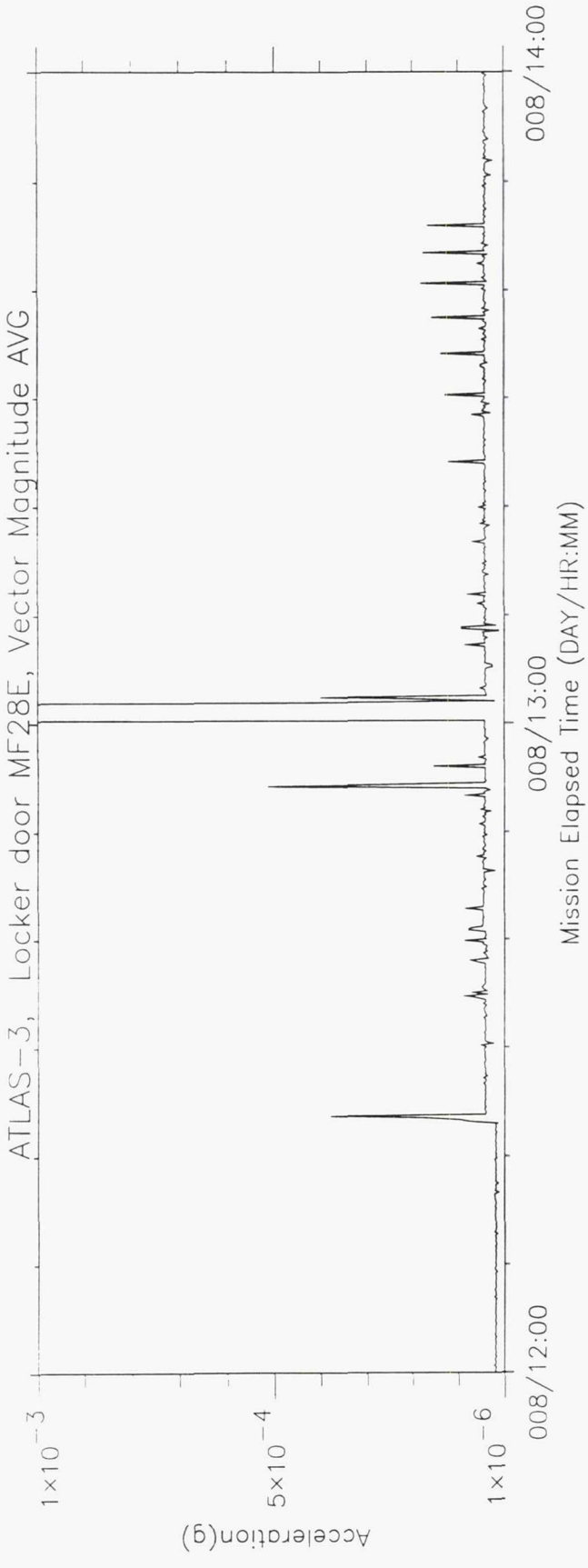
ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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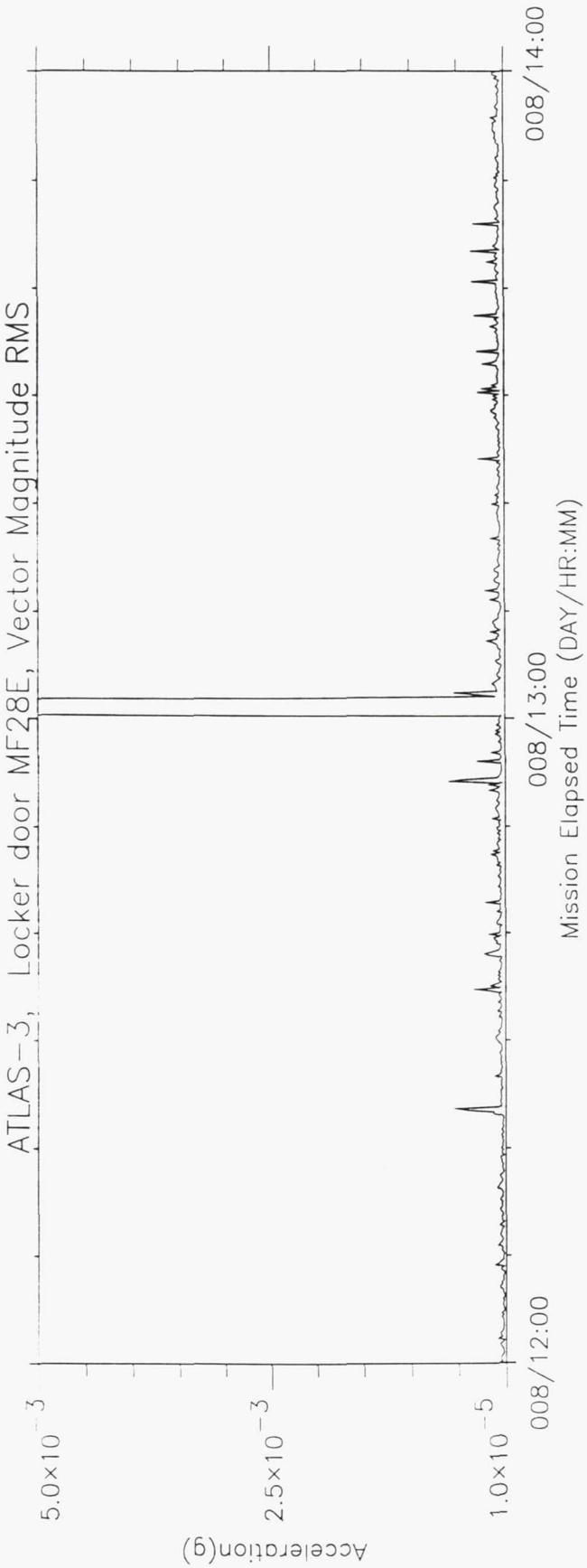
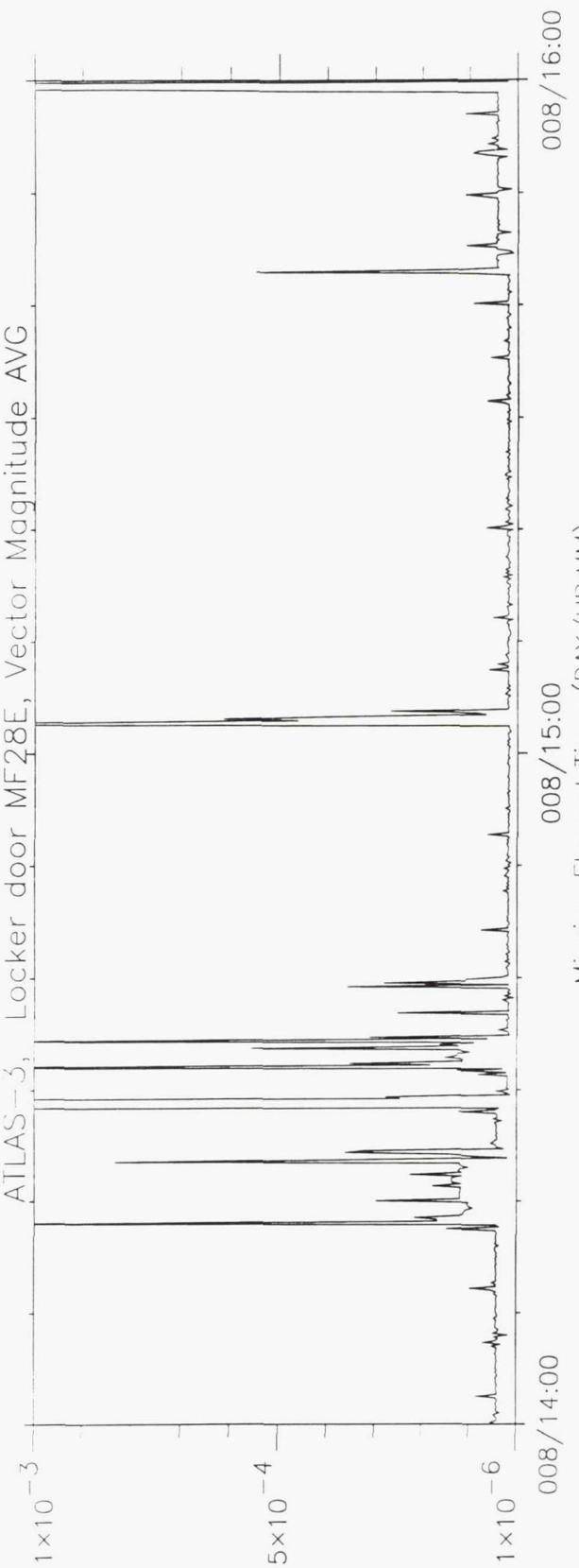
1×10^-6
Acceleration(g)
008/12:00
008/13:00
008/14:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10^-3
2.5×10^-3
1.0×10^-5
Acceleration(g)
008/12:00
008/13:00
008/14:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
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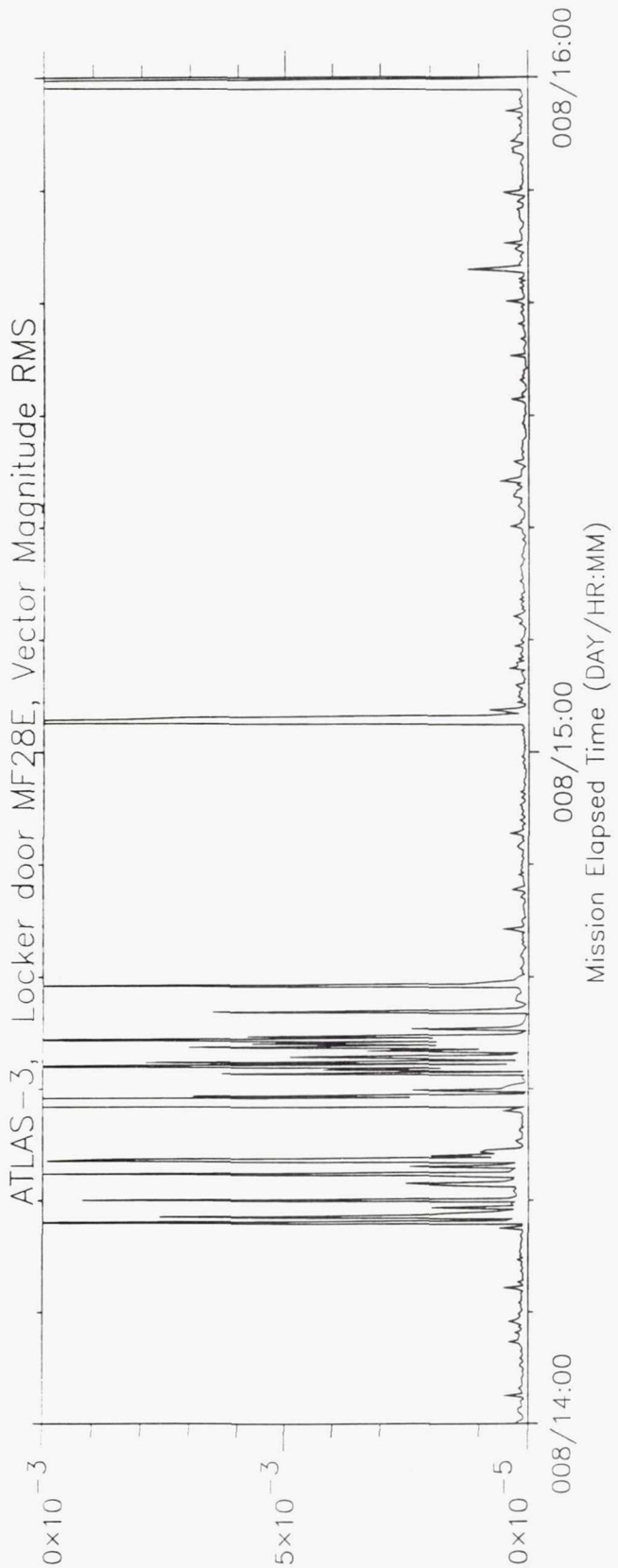
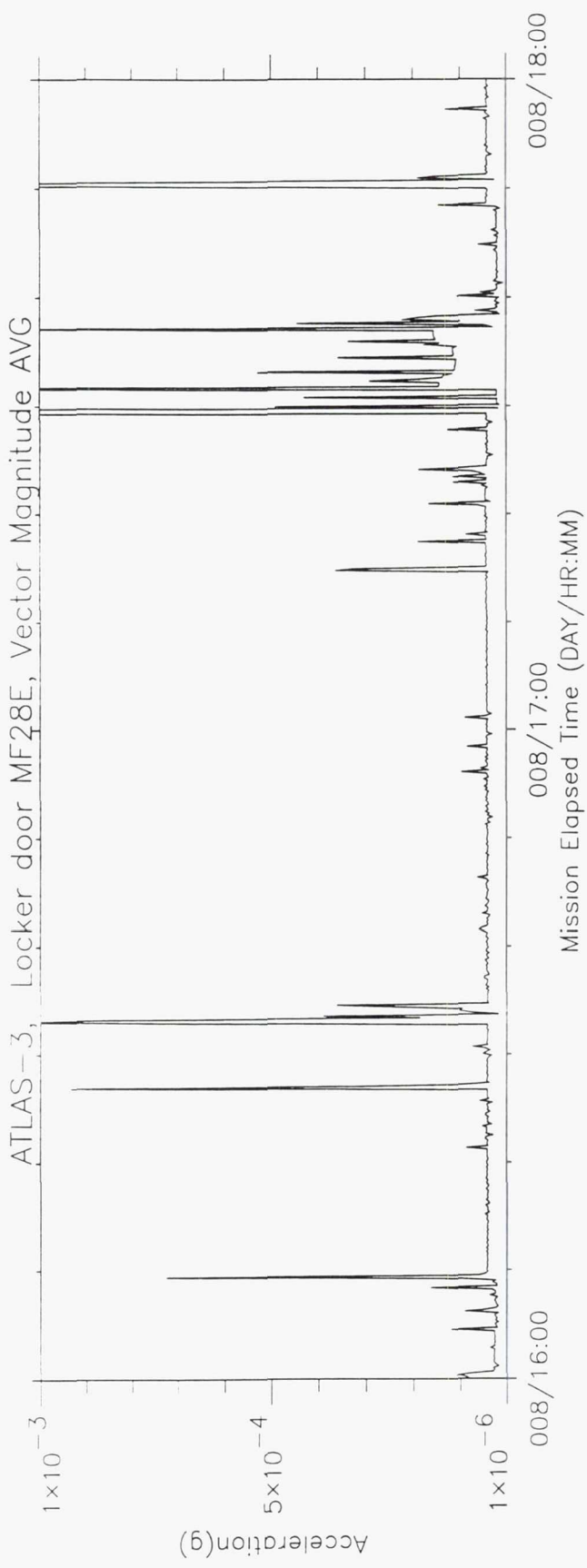
1×10⁻⁶
008/14:00
008/15:00
008/16:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
008/14:00
008/15:00
008/16:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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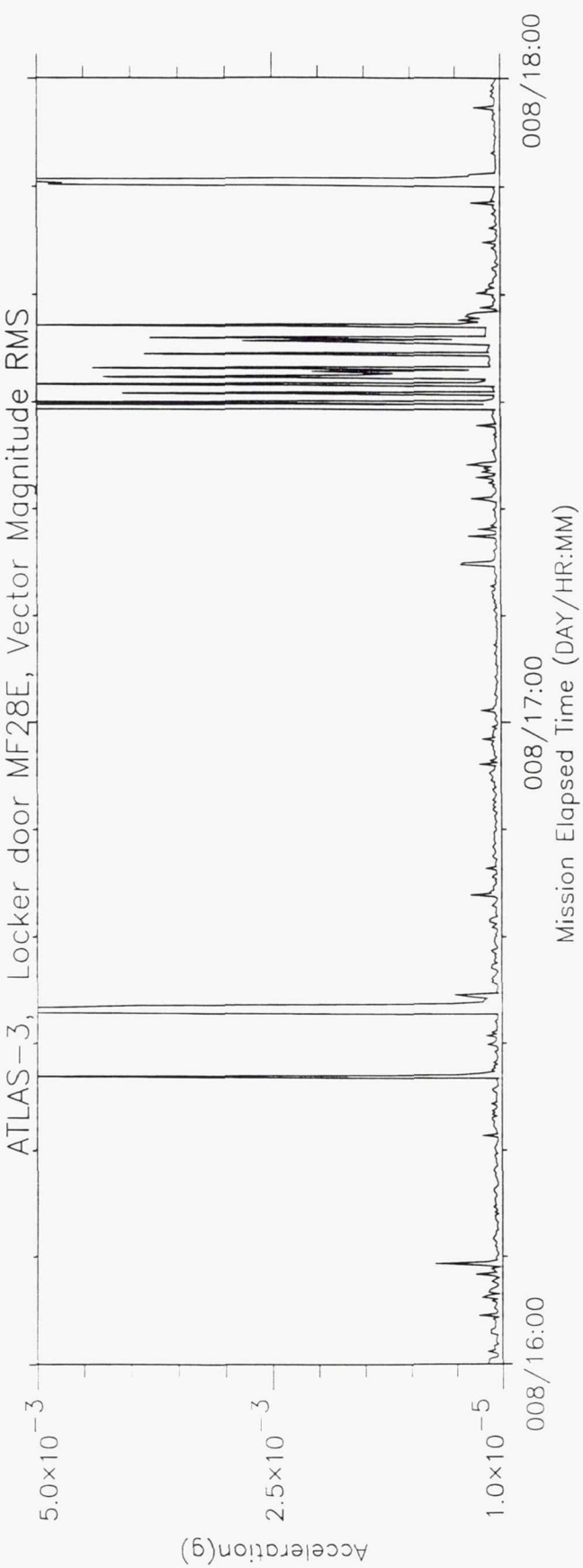
1×10^-6
Acceleration(g)
008/16:00
008/17:00
008/18:00
Mission Elapsed Time (DAY/HR:MM)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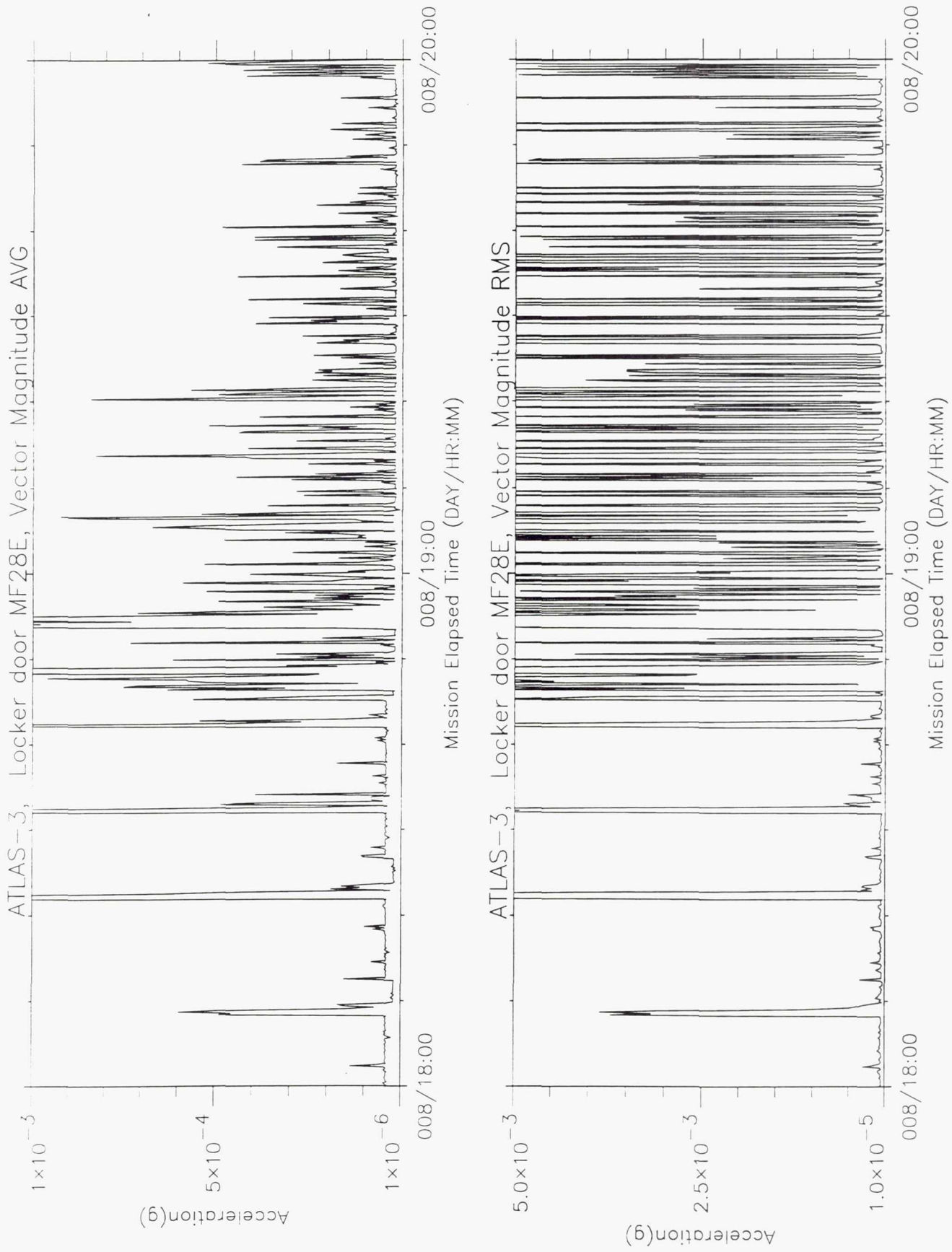
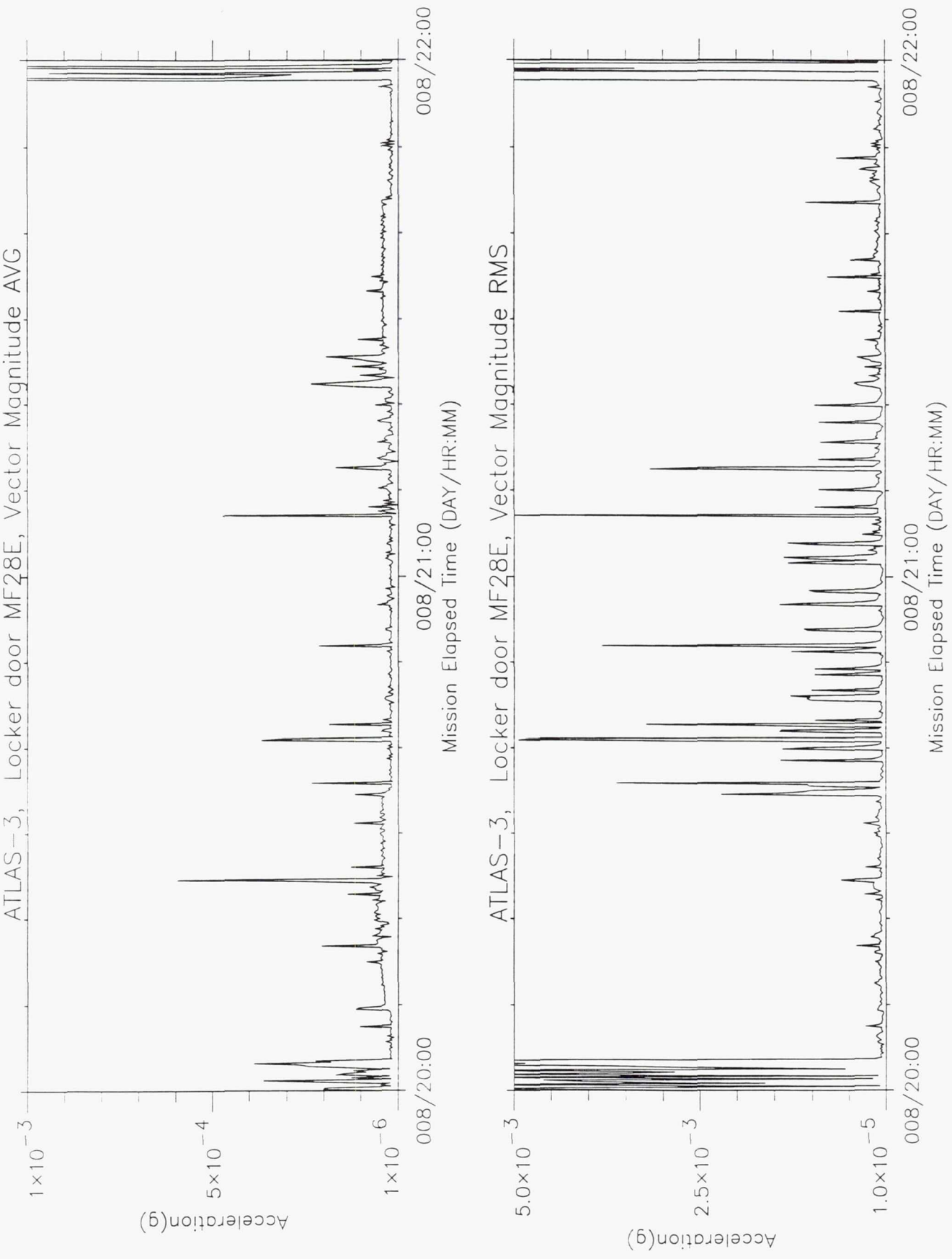
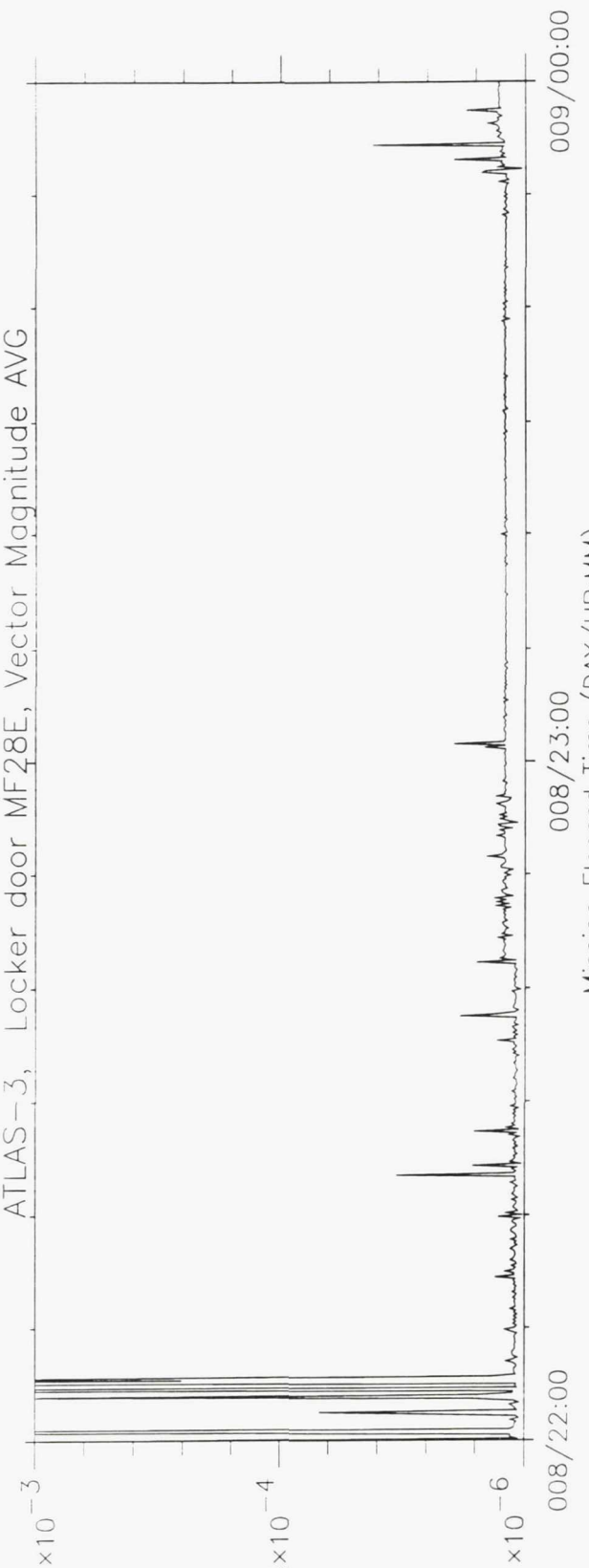
Acceleration(g)
008/16:00
008/17:00
008/18:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10⁻³
5×10⁻⁴
1×10⁻⁶
Acceleration(g)
008/18:00
008/19:00
008/20:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
Acceleration(g)
008/18:00
008/19:00
008/20:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10⁻³
5×10⁻⁴
1×10⁻⁶
Acceleration(g)
008/20:00
008/21:00
008/22:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
Acceleration(g)
008/20:00
008/21:00
008/22:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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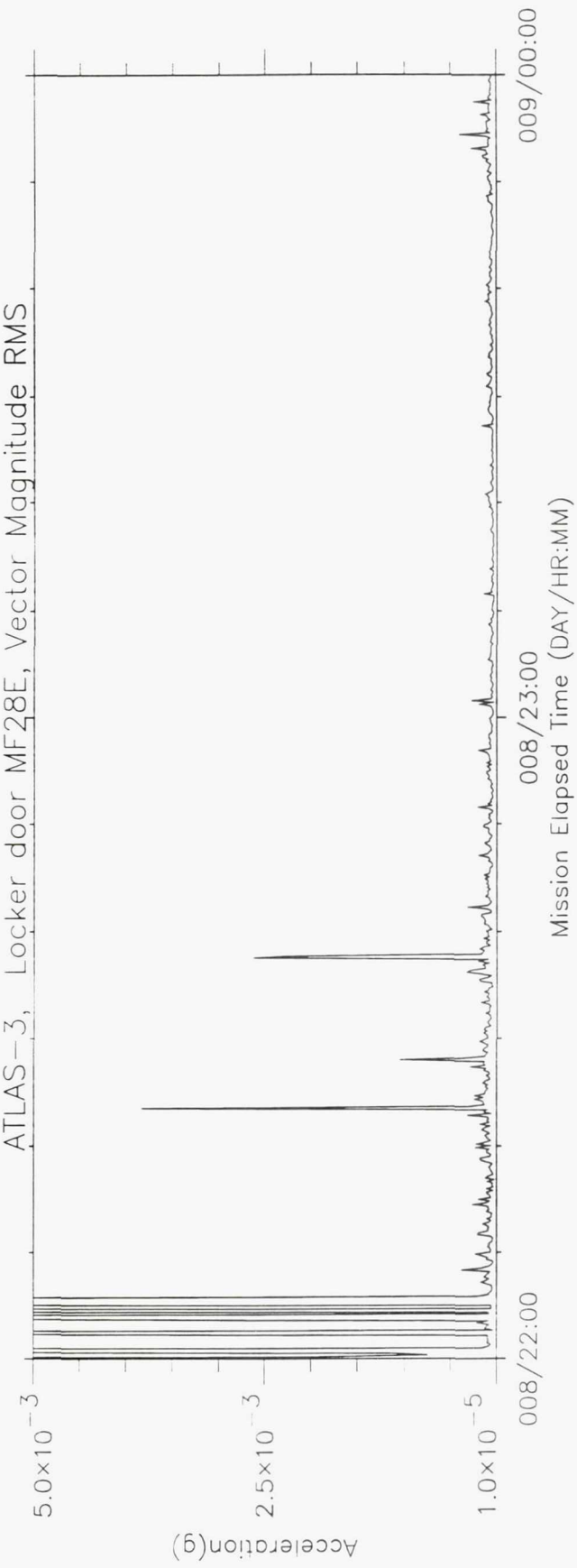
1×10^-6
Acceleration(g)
008/22:00
008/23:00
009/00:00
Mission Elapsed Time (DAY/HR:MM)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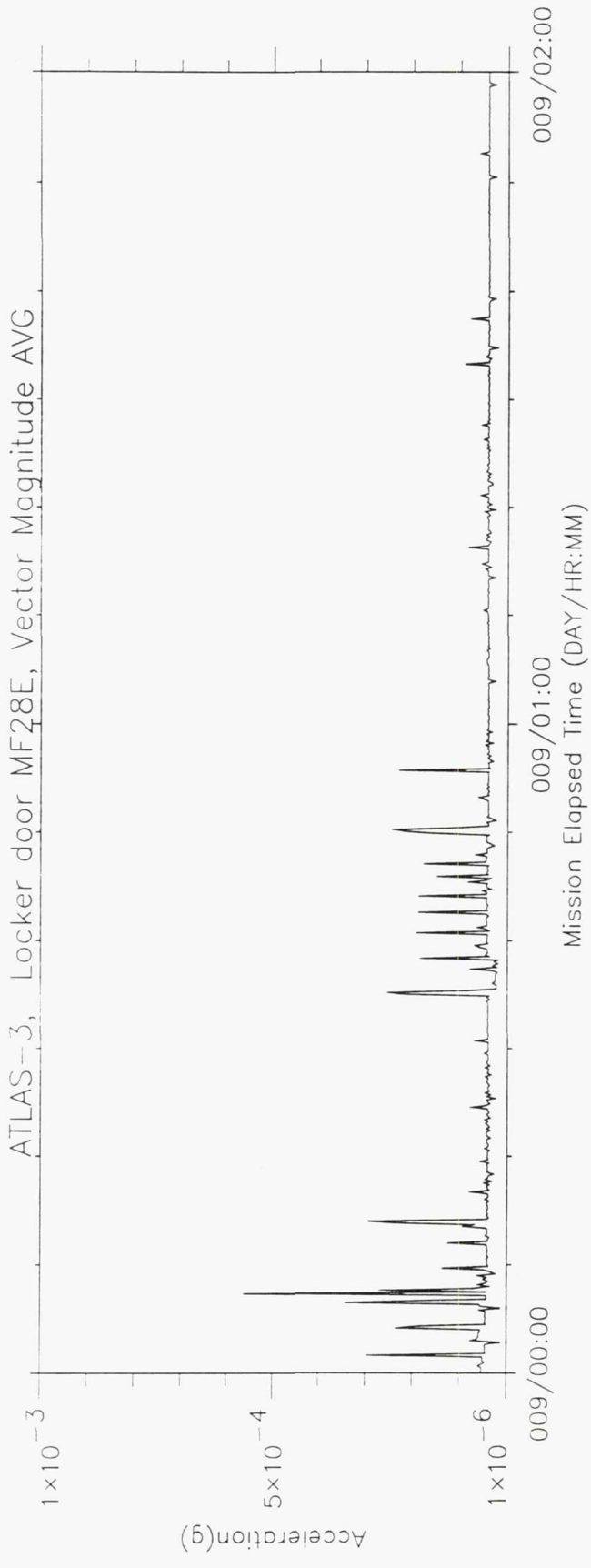
Acceleration(g)
008/22:00
008/23:00
009/00:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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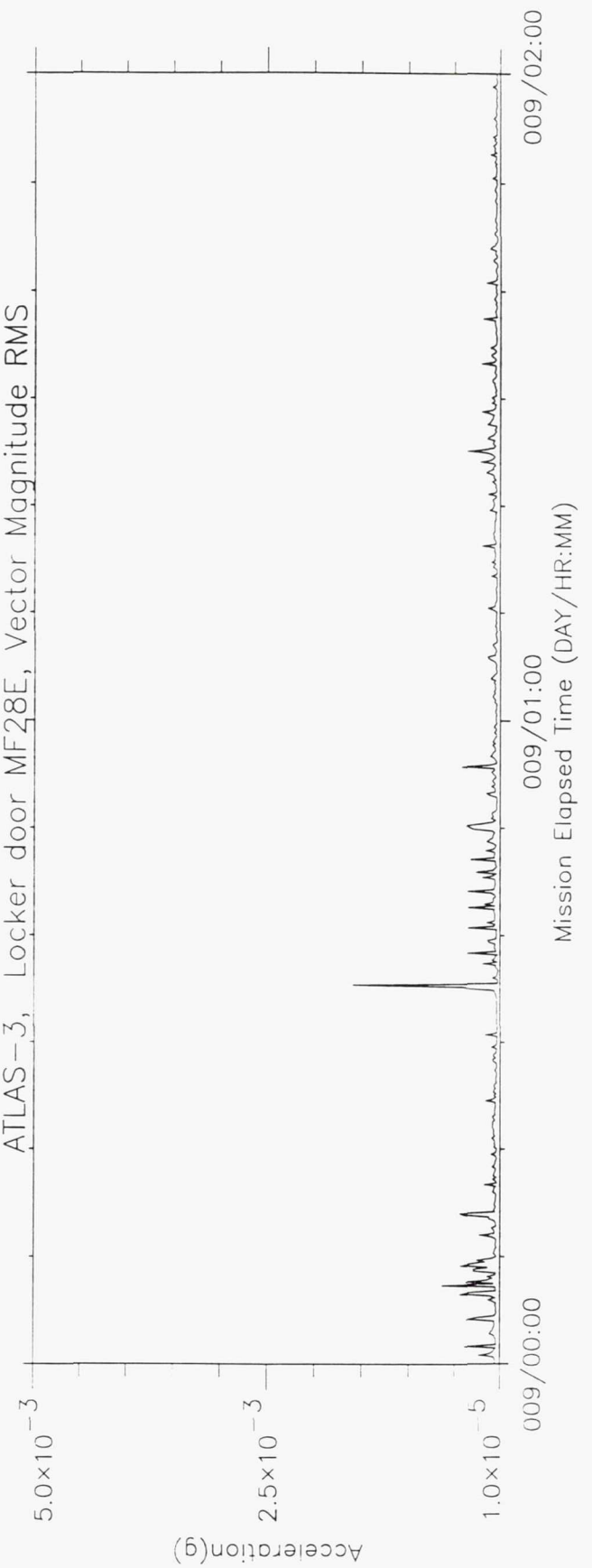
1×10^-6
Acceleration(g)
009/00:00
009/01:00
009/02:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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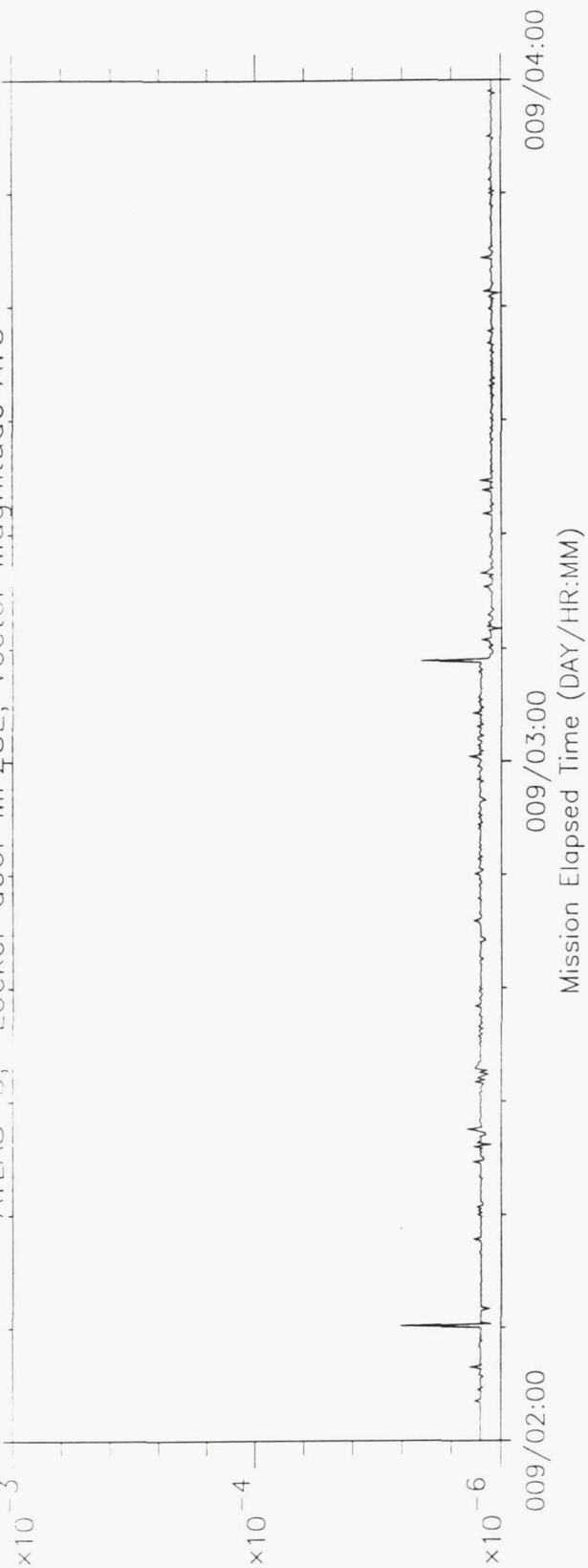
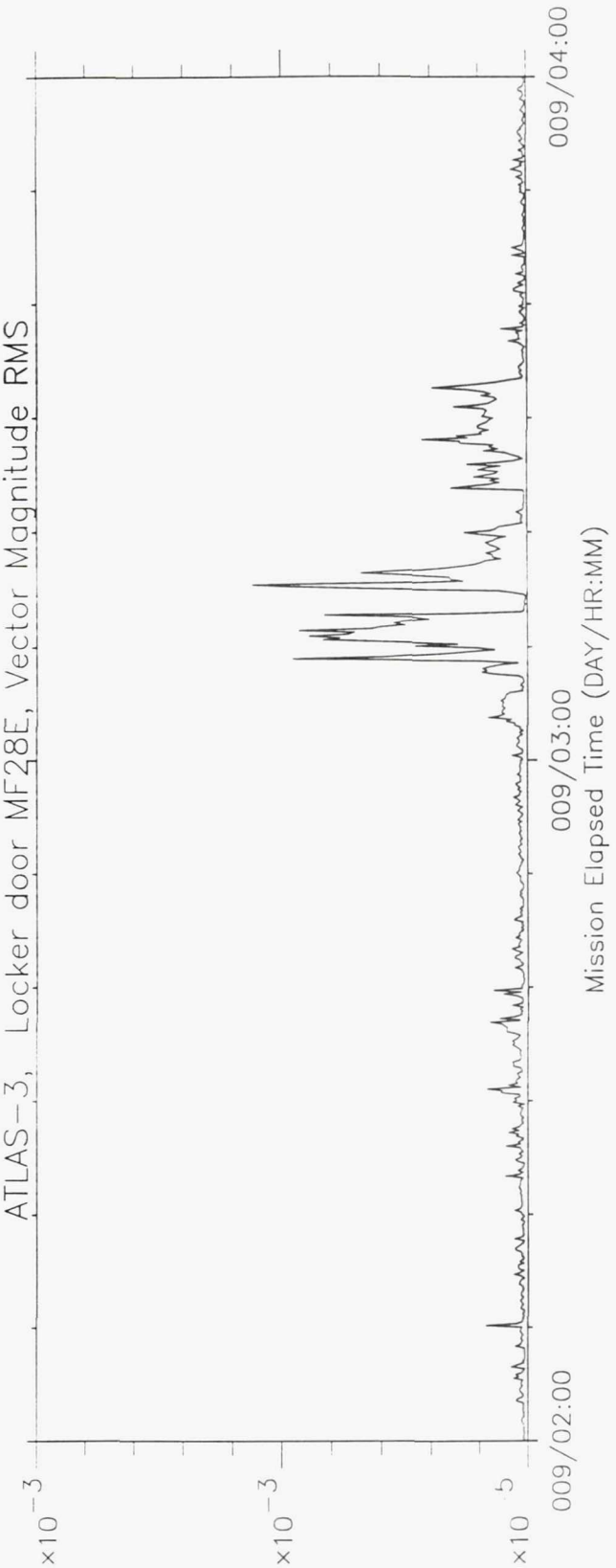
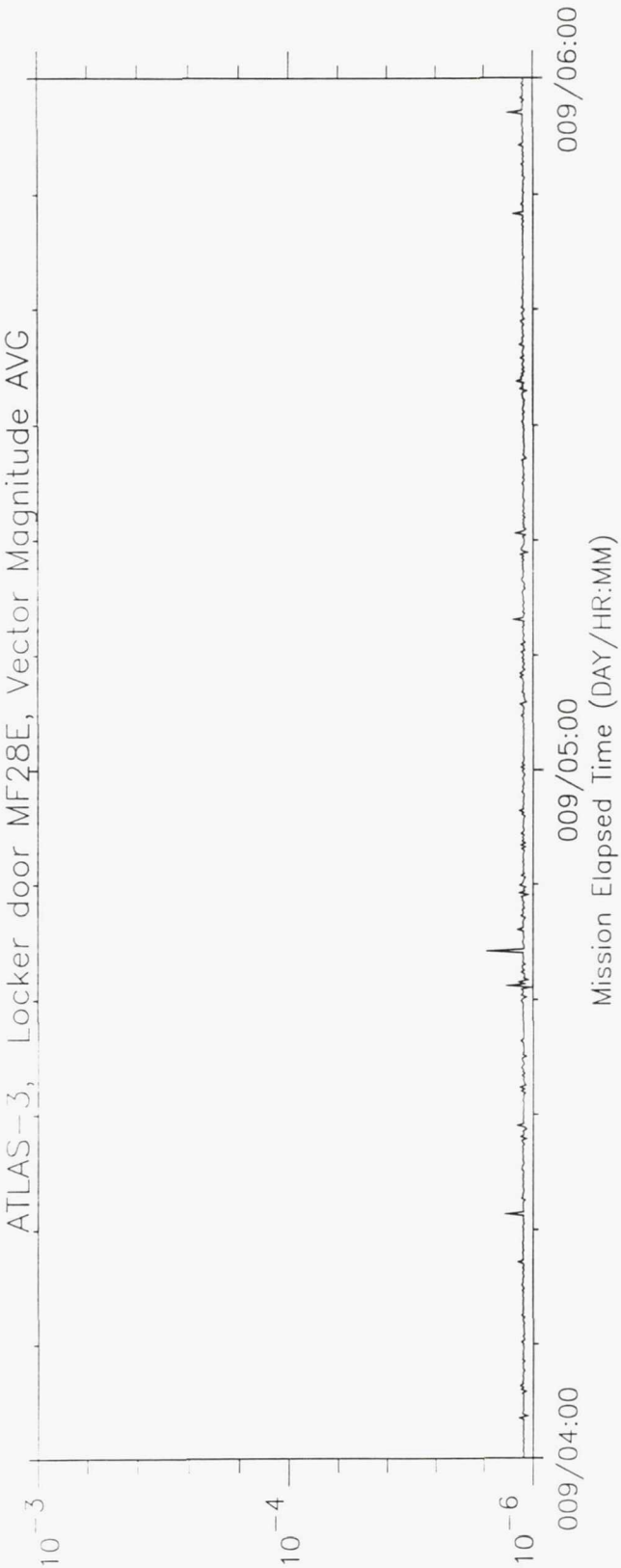
Acceleration(g)
009/00:00
009/01:00
009/02:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10⁻³
5×10⁻⁴
1×10⁻⁶
Acceleration(g)
009/02:00
009/03:00
009/04:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
Acceleration(g)
009/02:00
009/03:00
009/04:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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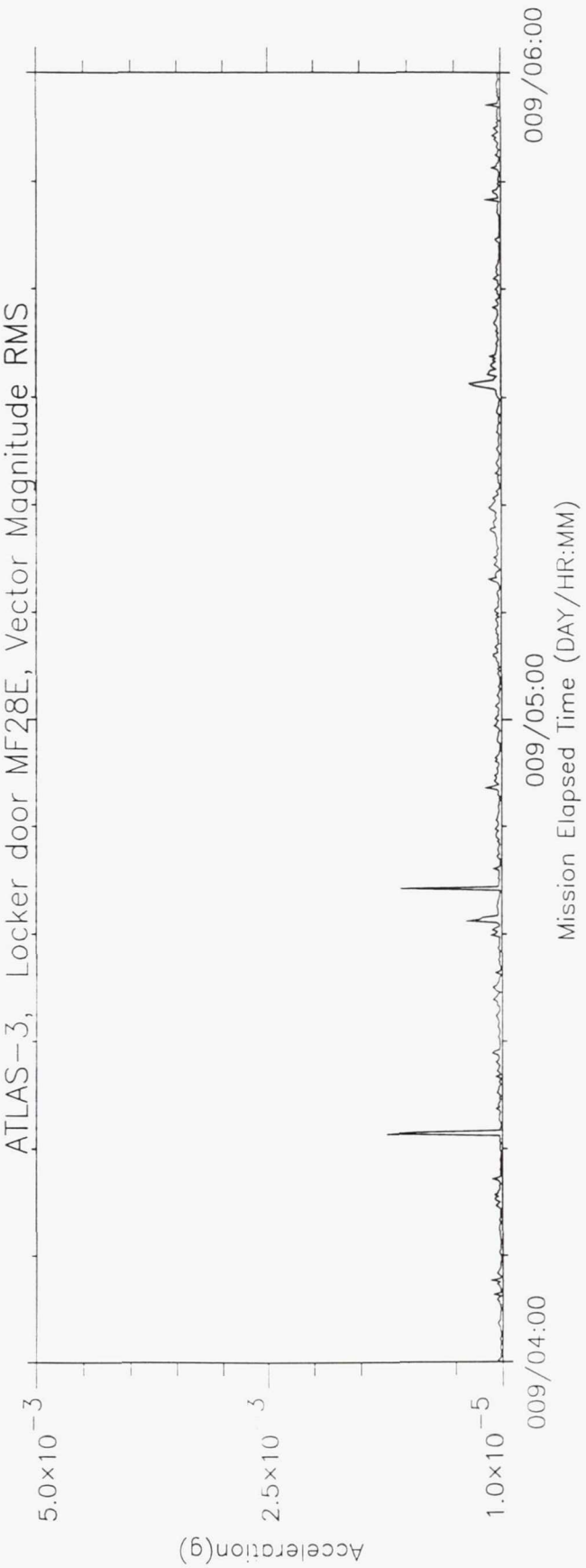
1×10^-6
Acceleration(g)
009/04:00
009/05:00
009/06:00
Mission Elapsed Time (DAY/HR:MM)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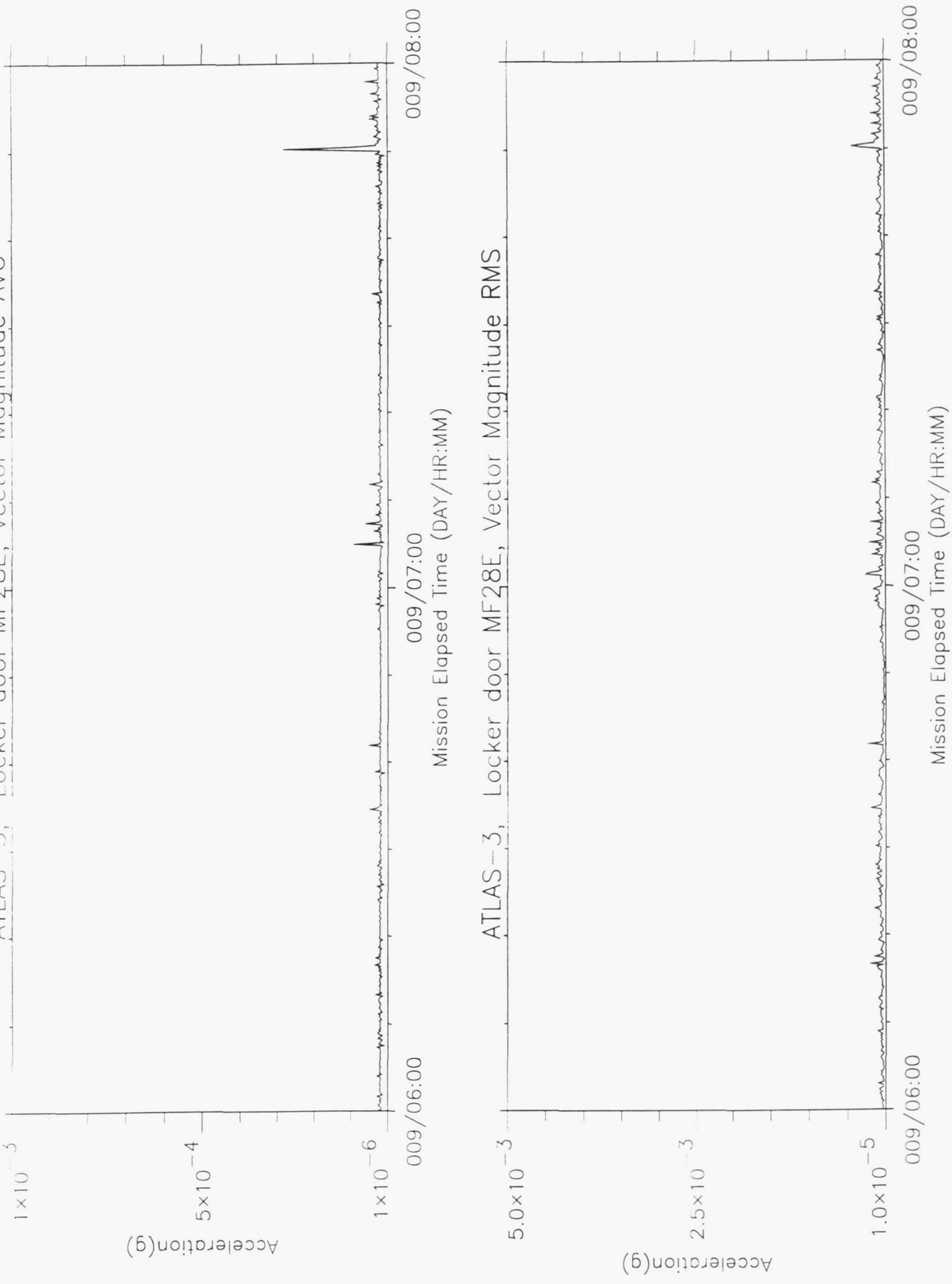
Acceleration(g)
009/04:00
009/05:00
009/06:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
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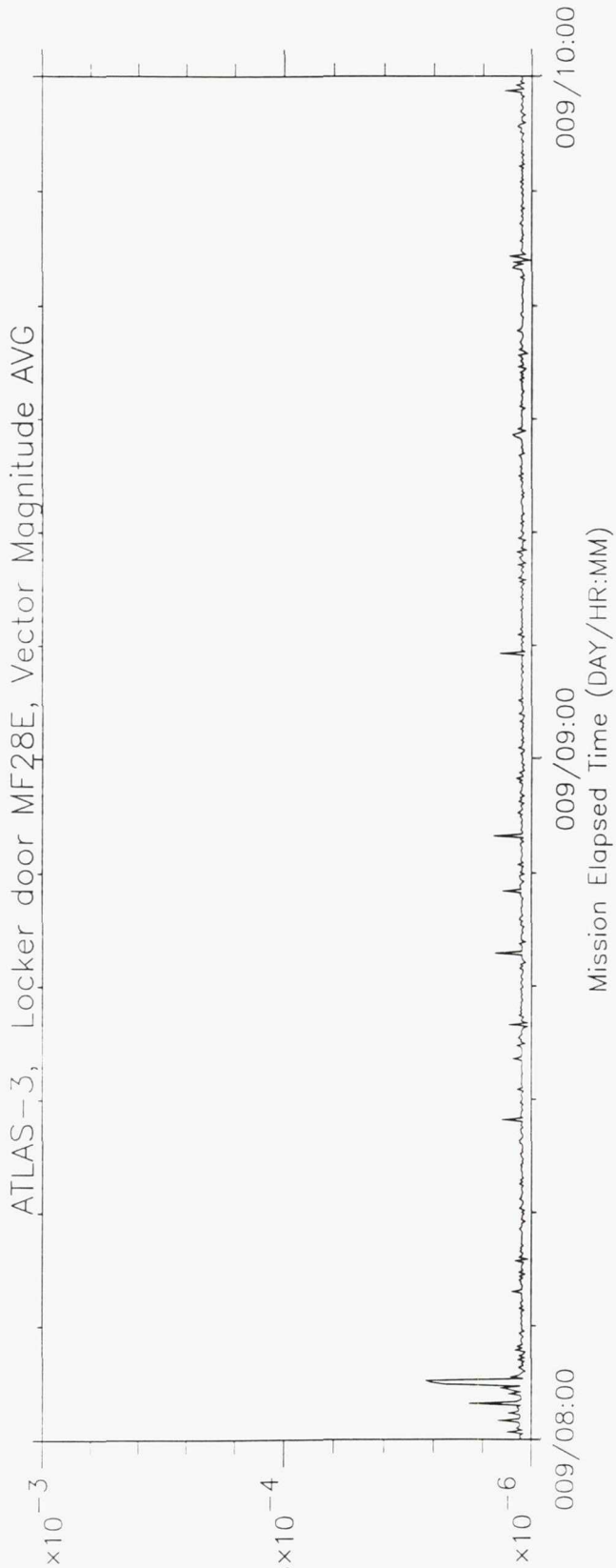
5×10⁻⁴
1×10⁻⁶
009/06:00
009/07:00
009/08:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
009/06:00
009/07:00
009/08:00
Mission Elapsed Time (DAY/HR:MM)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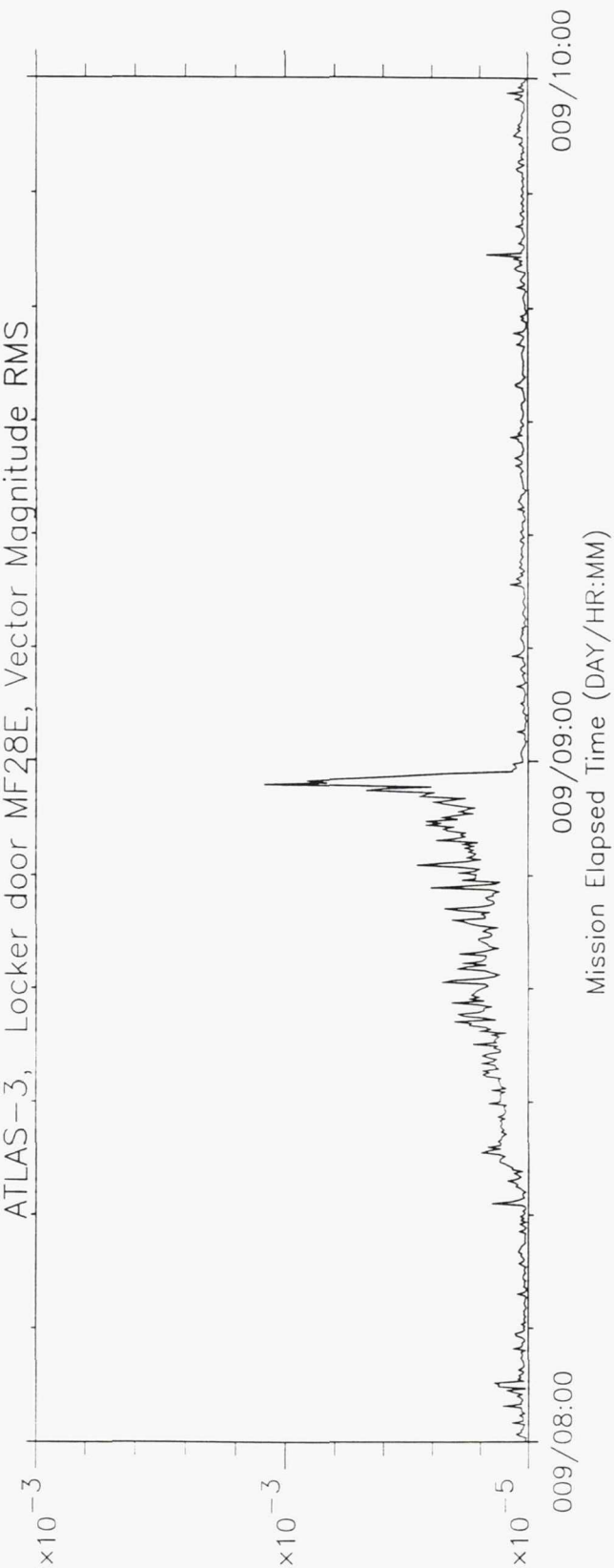
Acceleration(g)
009/08:00
009/09:00
009/10:00
Mission Elapsed Time (DAY/HR:MM)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Acceleration(g)
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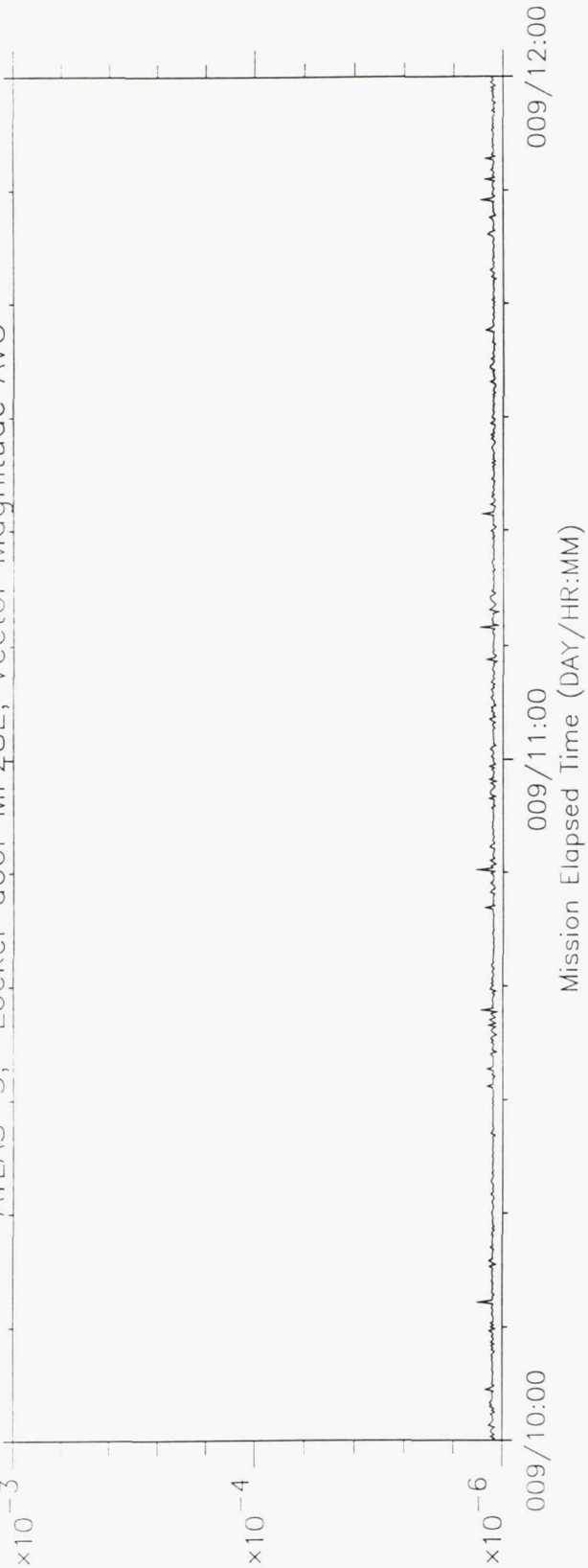
009/09:00
009/10:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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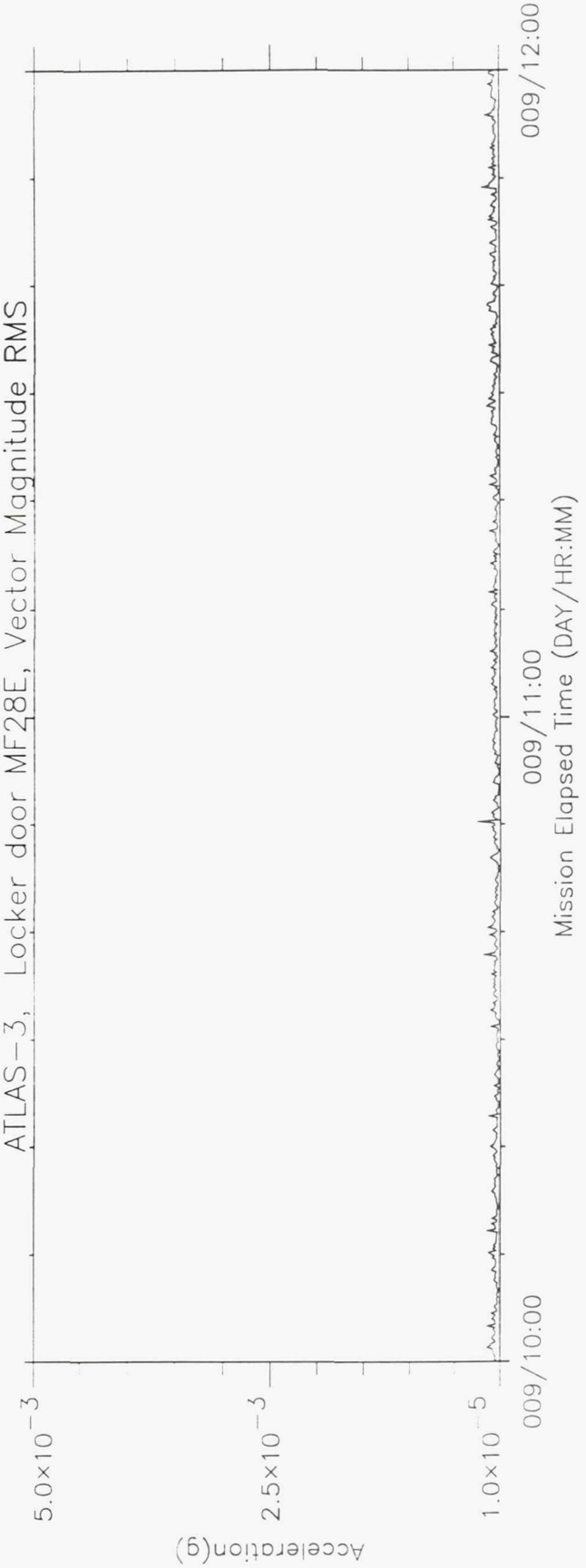
Acceleration(g)
009/10:00
009/11:00
009/12:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10⁻³
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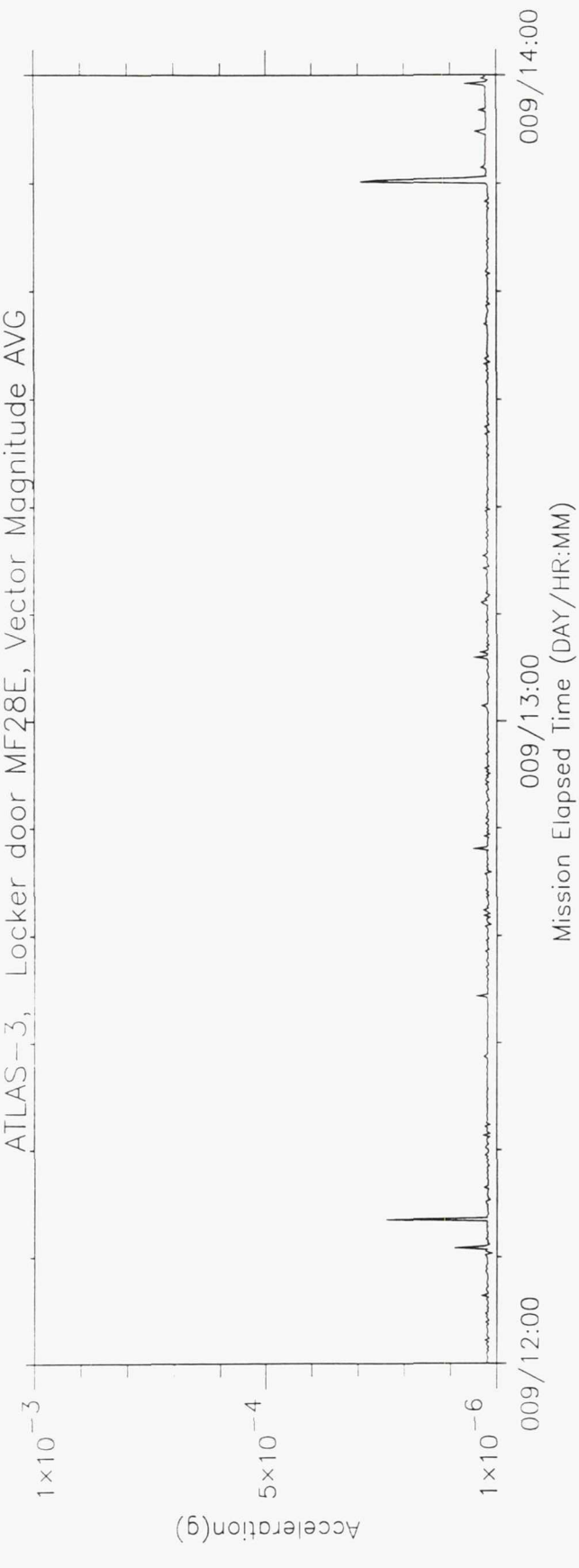
Acceleration(g)
009/10:00
009/11:00
009/12:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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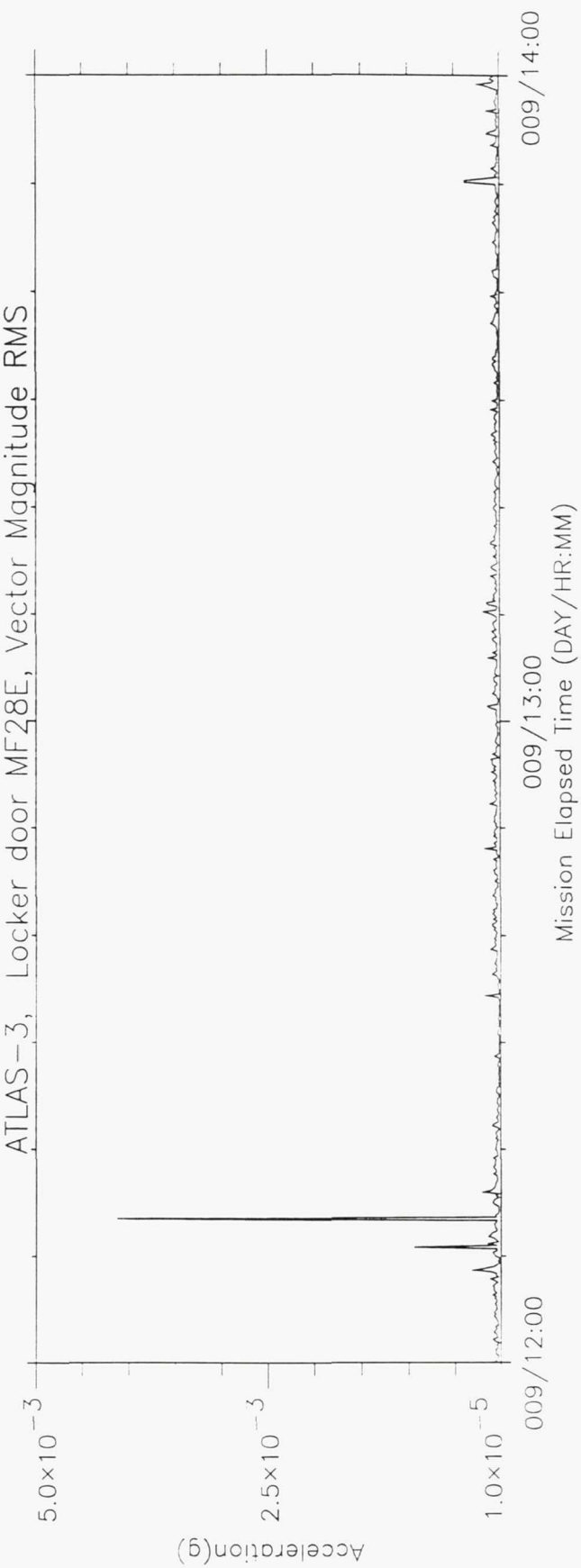
5×10^-4
1×10^-6
Acceleration(g)
009/12:00
009/13:00
009/14:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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2.5×10^-3
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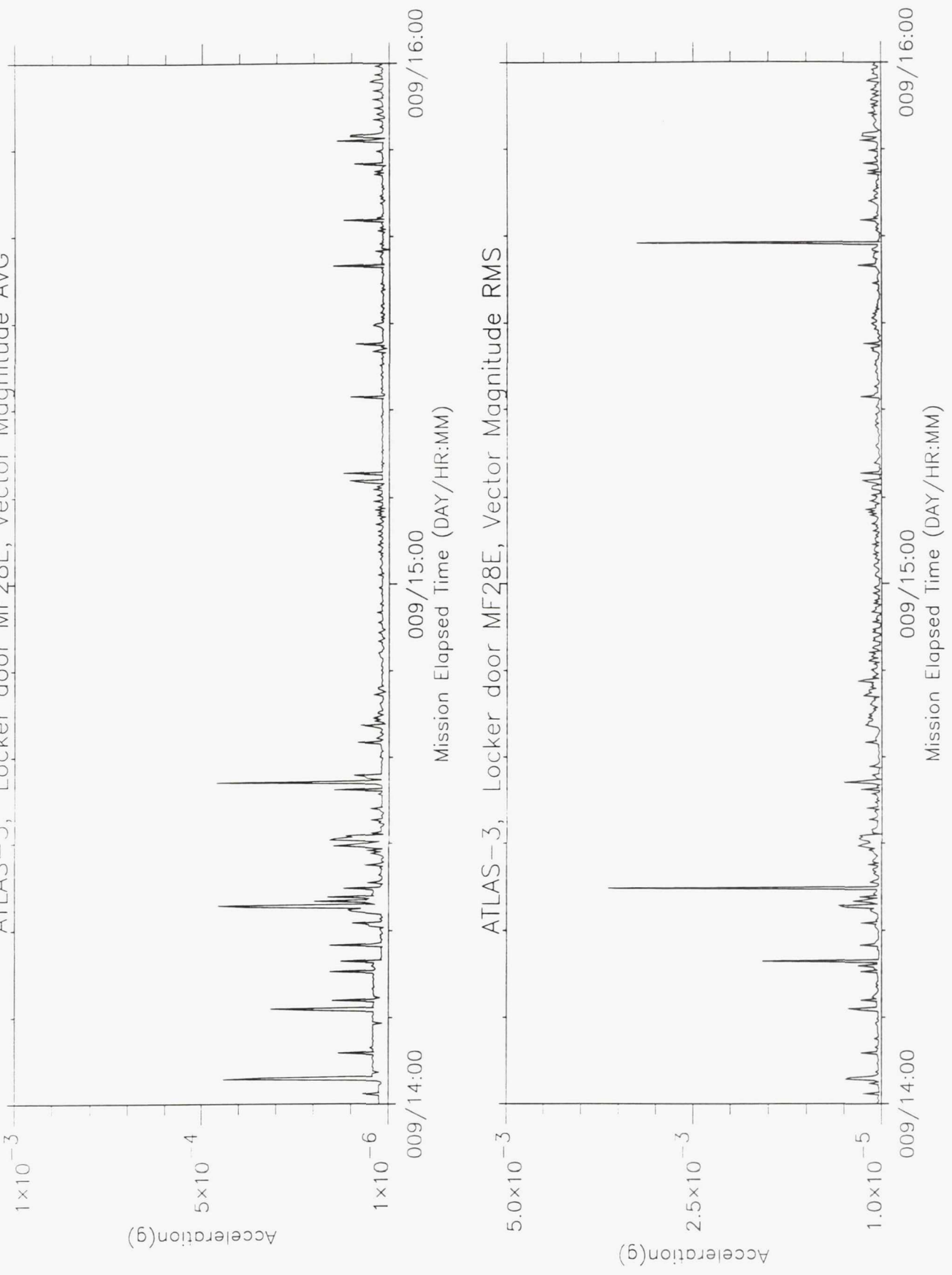
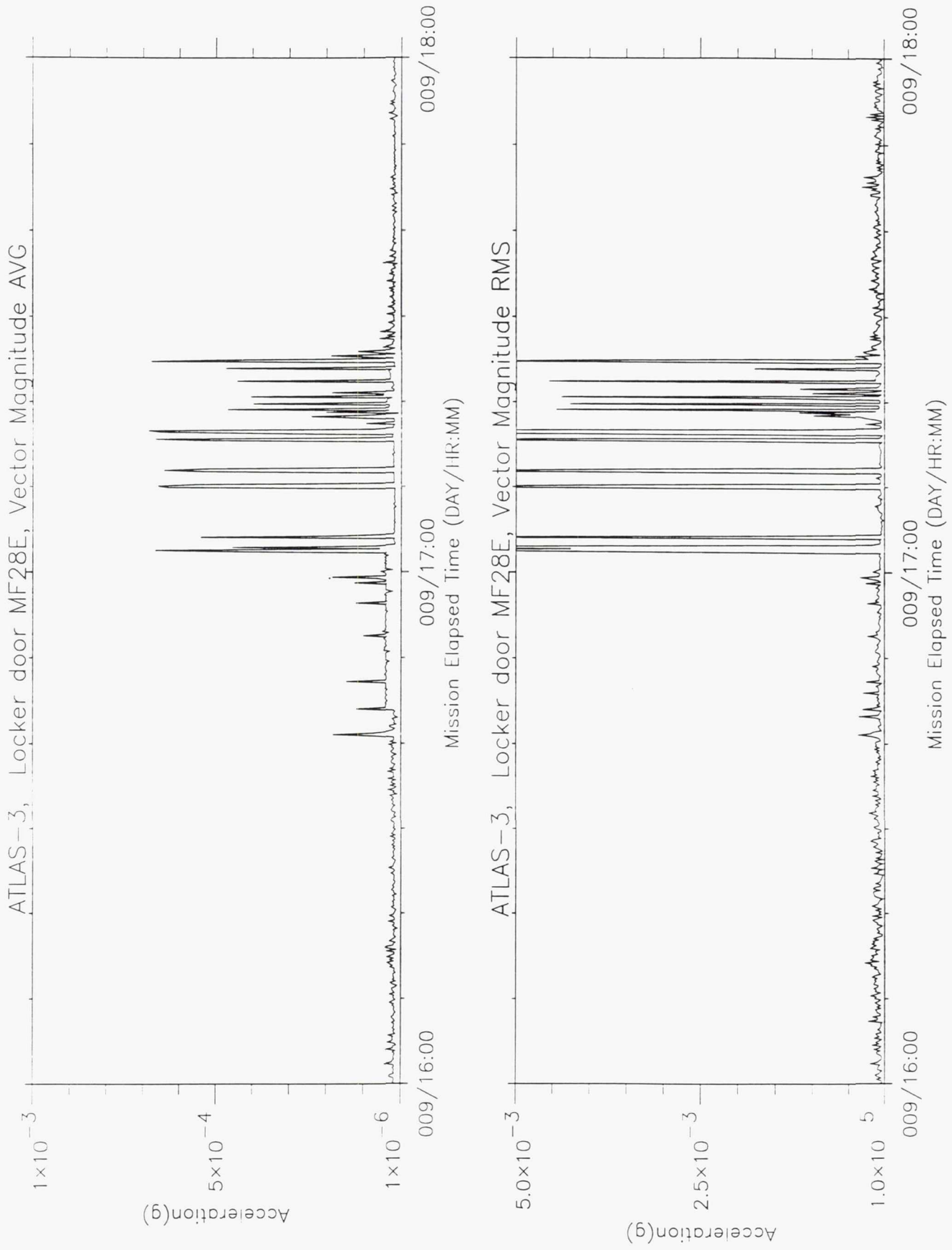
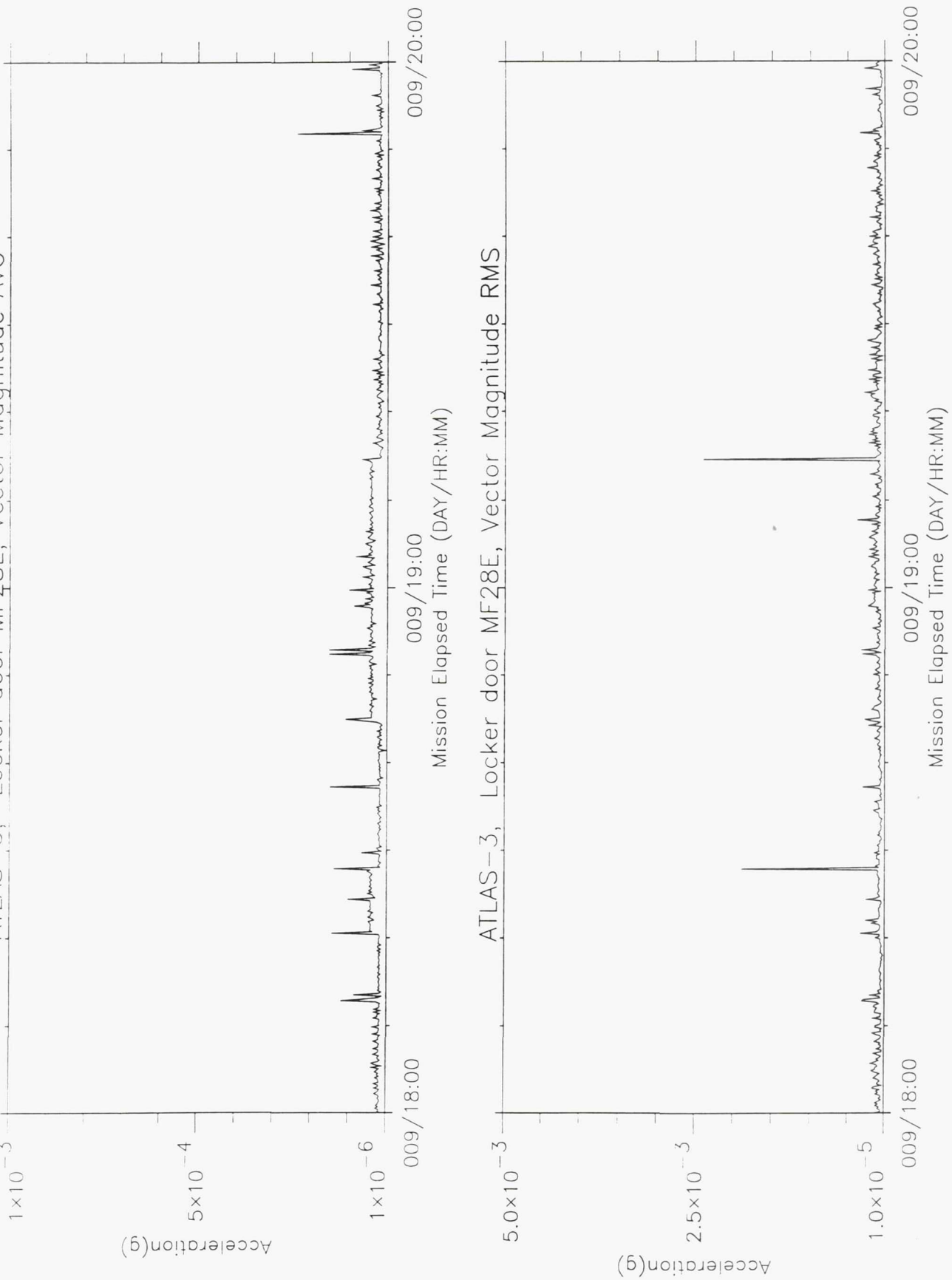
Acceleration(g)
009/12:00
009/13:00
009/14:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
1×10⁻³
5×10⁻⁴
1×10⁻⁶
Acceleration(g)
009/14:00
009/15:00
009/16:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
Acceleration(g)
009/14:00
009/15:00
009/16:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
1×10⁻³
5×10⁻⁴
1×10⁻⁶
009/16:00
009/17:00
009/18:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
009/16:00
009/17:00
009/18:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
1×10⁻³
5×10⁻⁴
1×10⁻⁶
009/18:00
009/19:00
009/20:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
009/18:00
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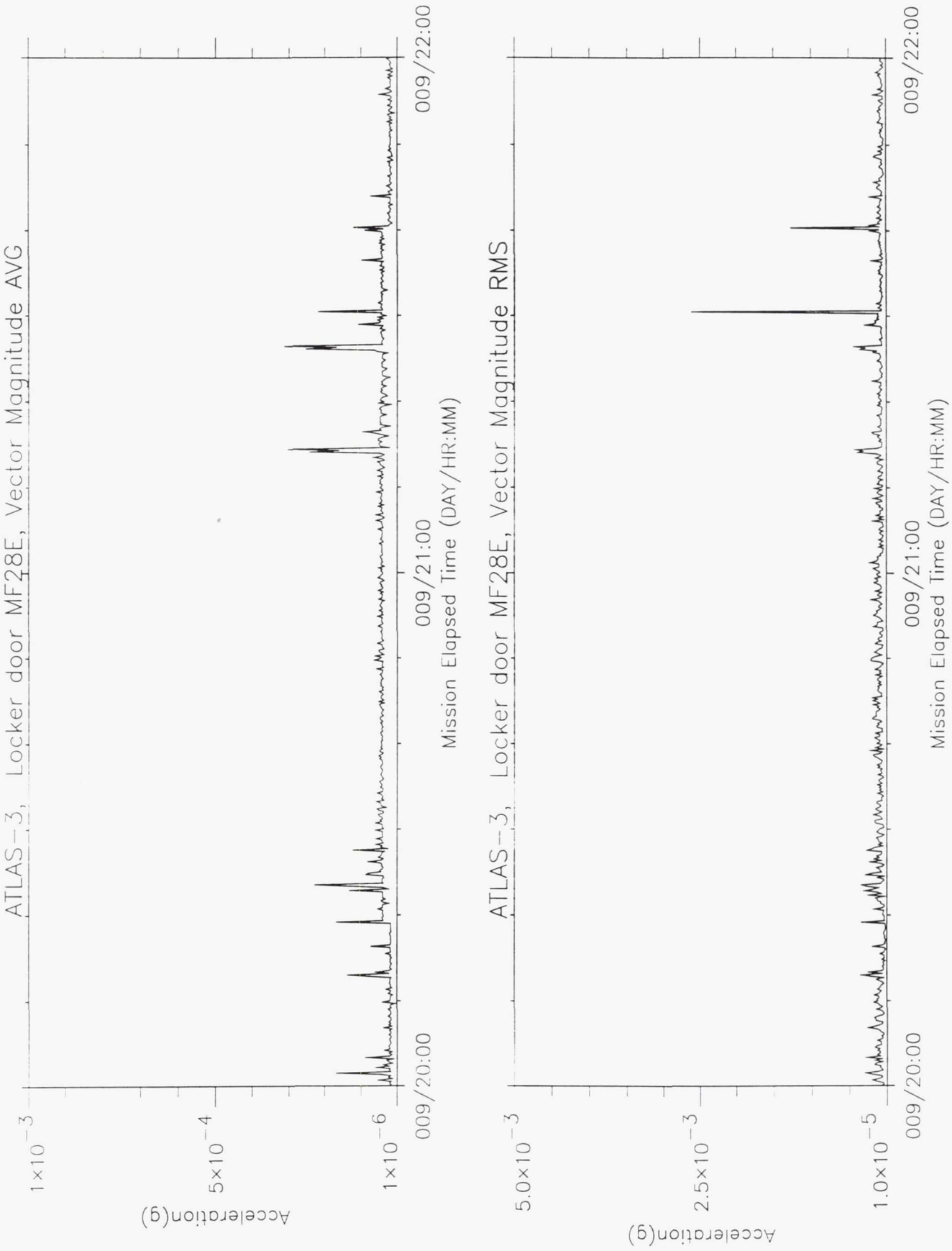
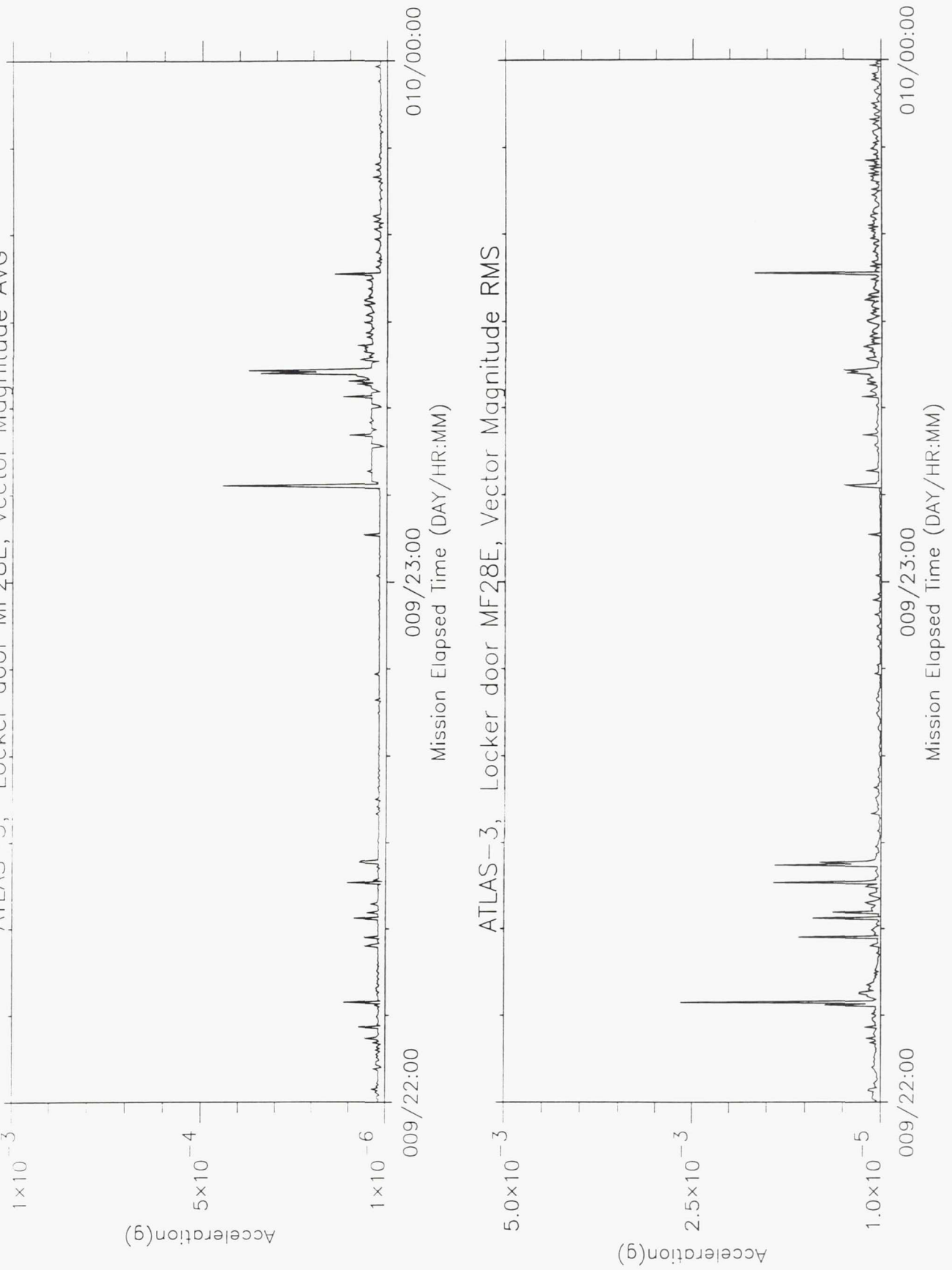
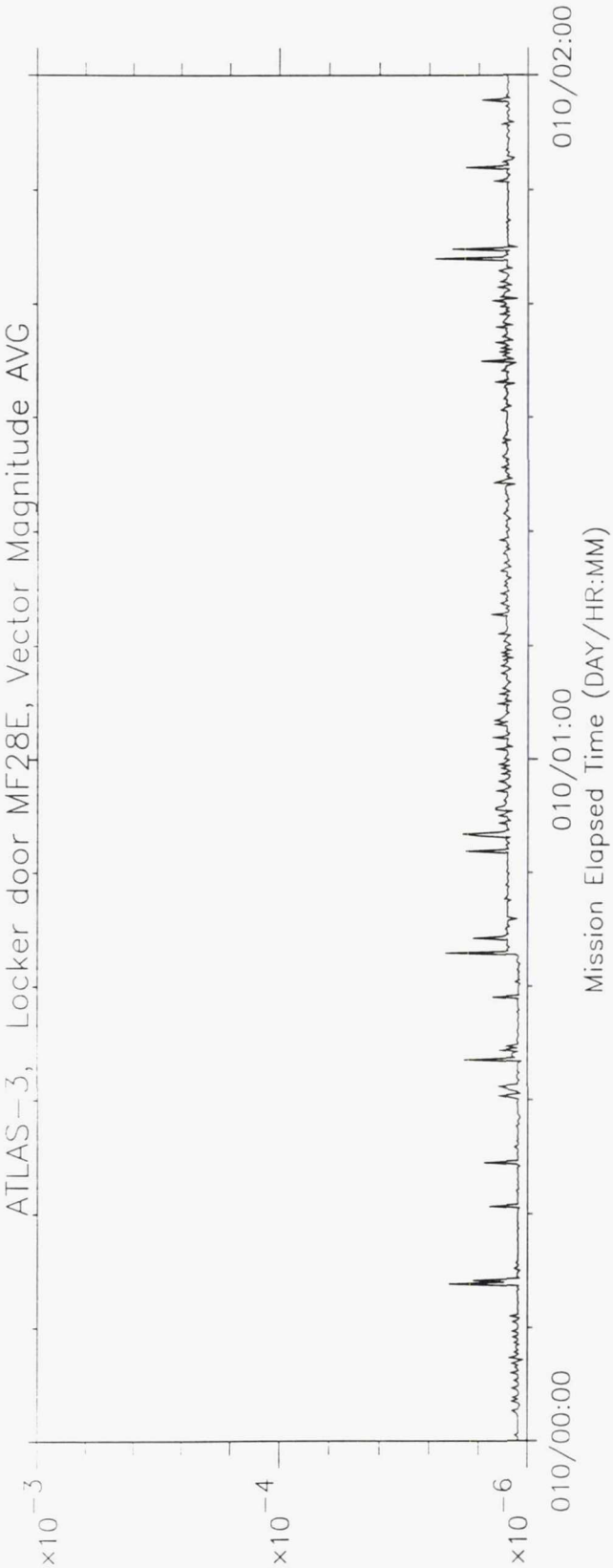
009/20:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
1×10⁻³
5×10⁻⁴
1×10⁻⁶
009/20:00
009/21:00
009/22:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
009/20:00
009/21:00
009/22:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
1×10⁻³
5×10⁻⁴
1×10⁻⁶
009/22:00
009/23:00
010/00:00
Mission Elapsed Time (DAY/HR:MM)
ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
009/22:00
009/23:00
010/00:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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Acceleration(g)
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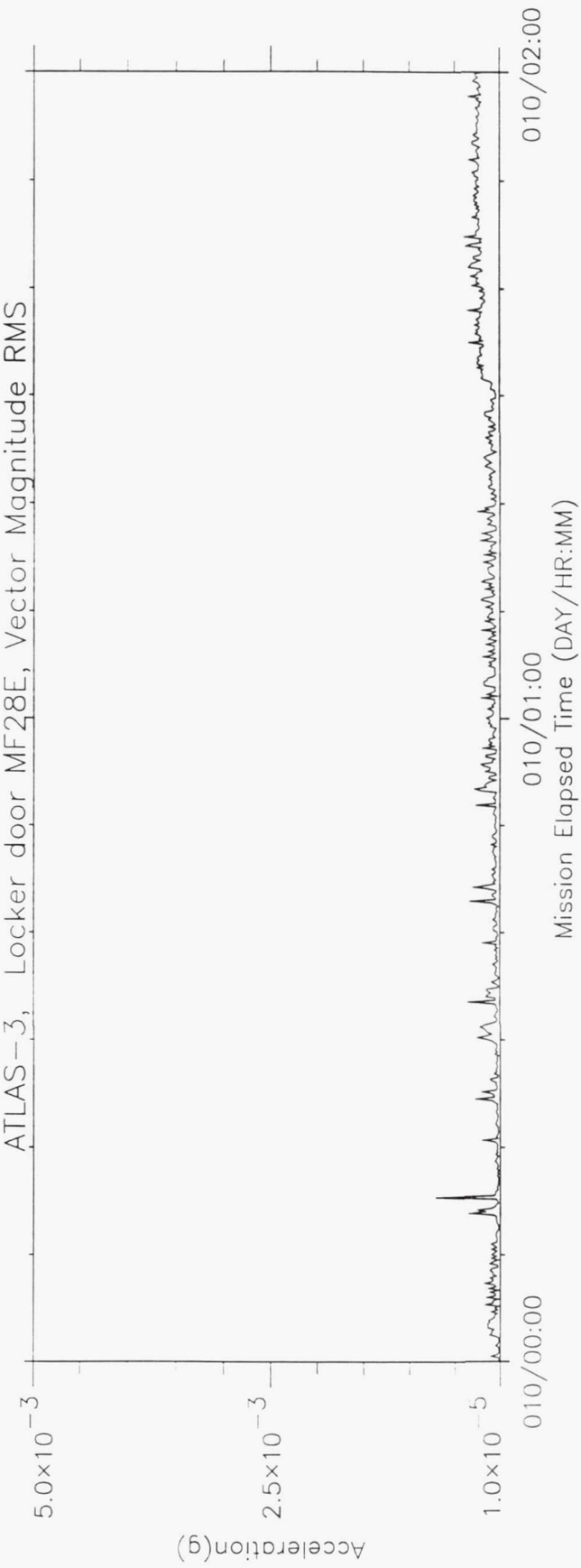
010/02:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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Acceleration(g)
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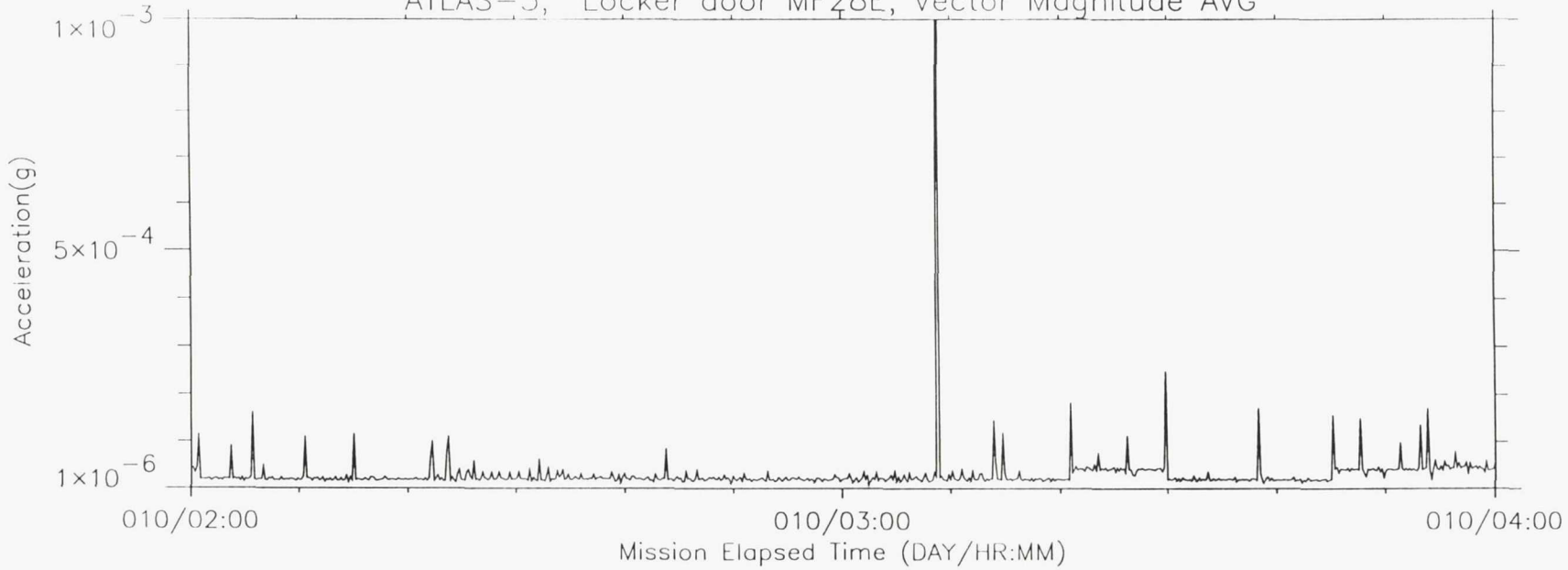
010/01:00
010/02:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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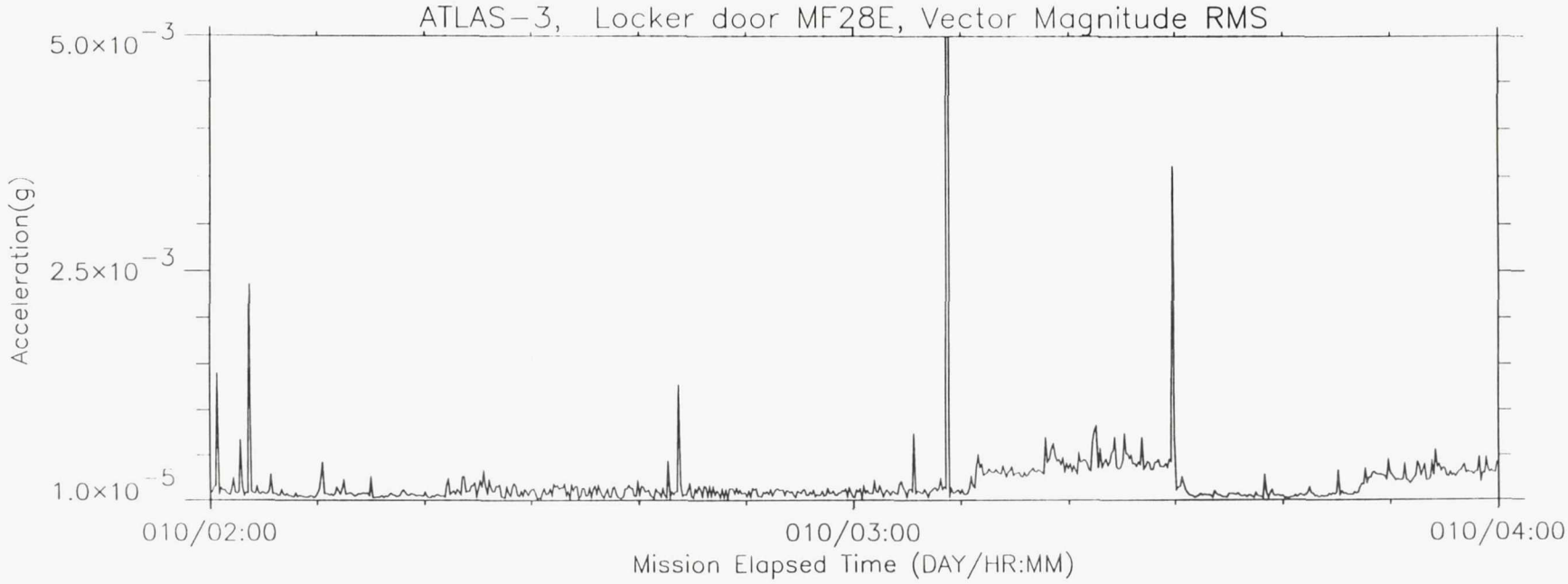
Acceleration(g)
010/02:00
010/03:00
010/04:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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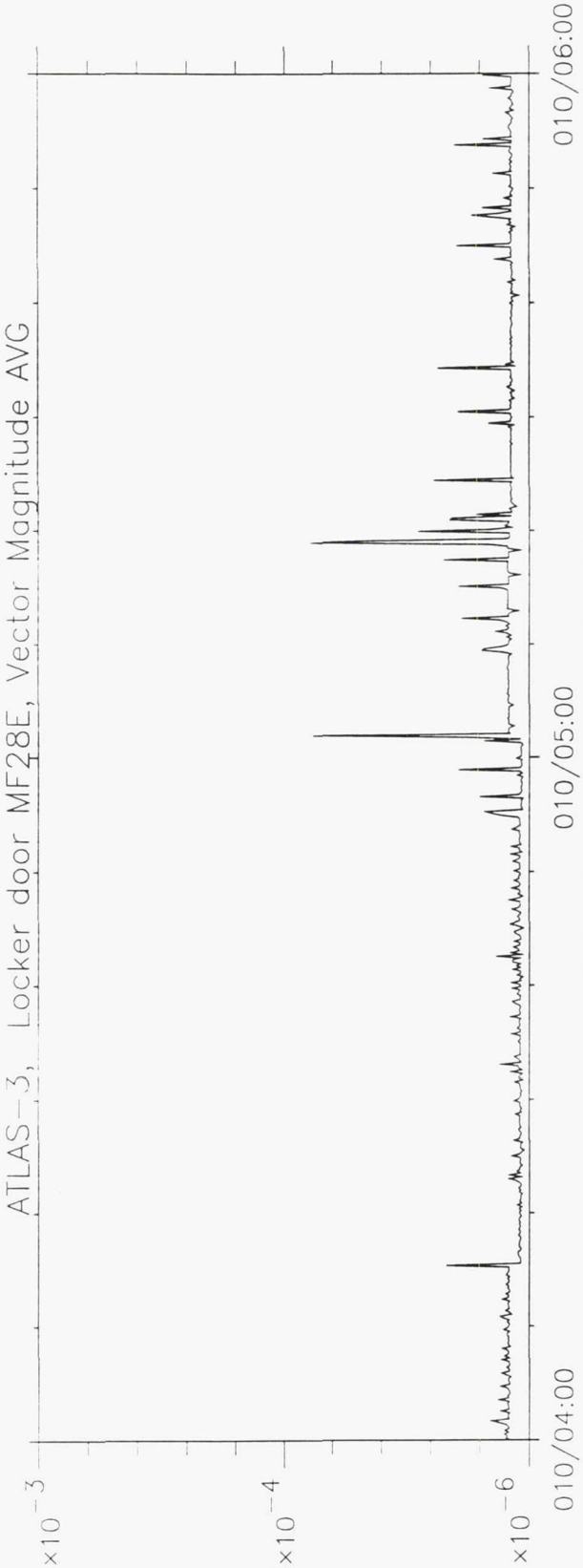
2.5×10⁻³
1.0×10⁻⁵
Acceleration(g)
010/02:00
010/03:00
010/04:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
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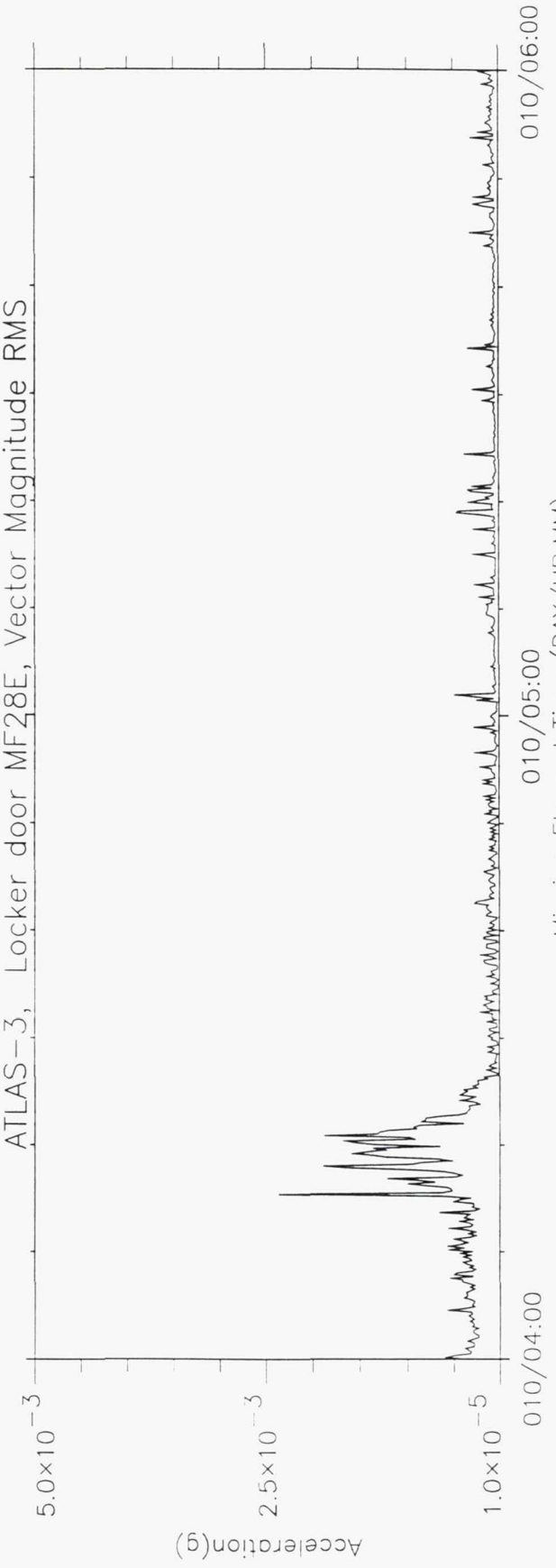
5×10^-4
1×10^-6
Acceleration(g)
010/04:00
010/05:00
010/06:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
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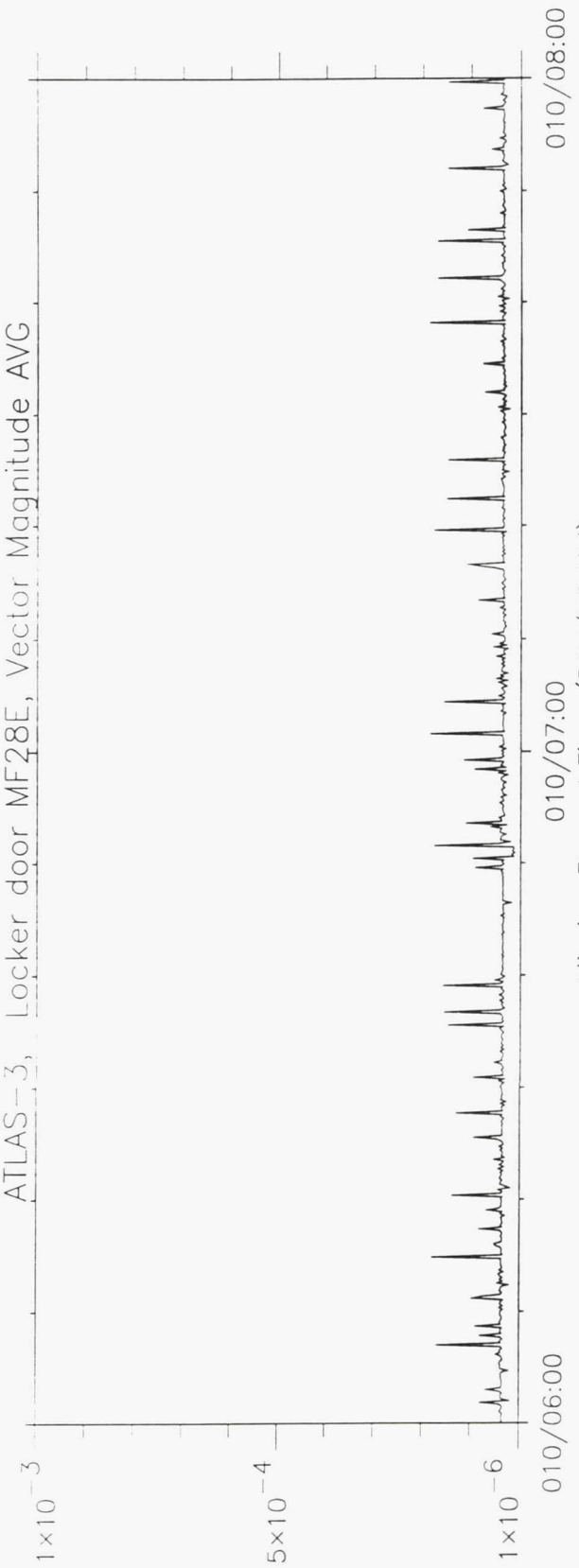
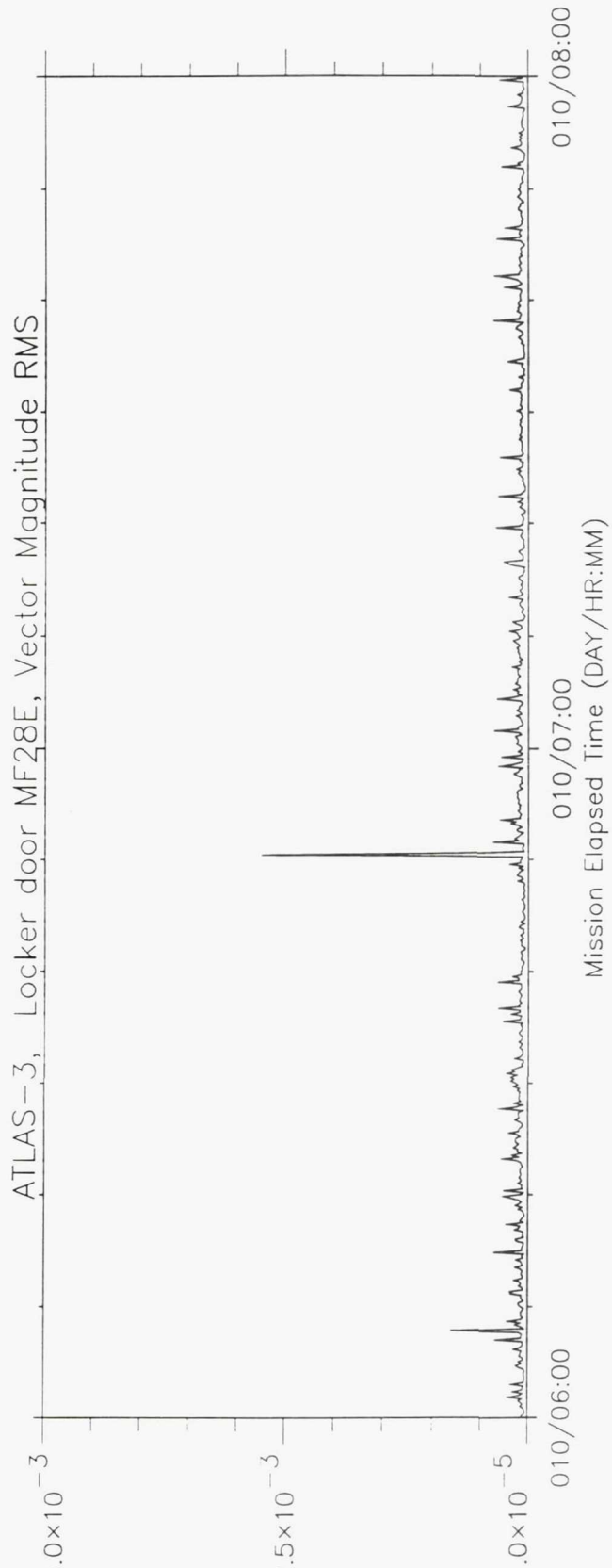
2.5×10^-3
1.0×10^-5
Acceleration(g)
010/04:00
010/05:00
010/06:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude AVG
Acceleration(g)
1×10⁻³
5×10⁻⁴
1×10⁻⁶
010/06:00
010/07:00
010/08:00
Mission Elapsed Time (DAY/HR:MM)


ATLAS-3, Locker door MF28E, Vector Magnitude RMS
Acceleration(g)
5.0×10⁻³
2.5×10⁻³
1.0×10⁻⁵
010/06:00
010/07:00
010/08:00
Mission Elapsed Time (DAY/HR:MM)

APPENDIX C SAMS COLOR SPECTROGRAMS

Accelerometer data collected on Orbiter missions are generally analyzed by the principal investigator or experiment team responsible for the system. The PIMS project at the NASA Lewis Research Center was formed in part to support microgravity PI's in the evaluation of acceleration effects on their experiments and to characterize the vibrational environment of the Space Shuttle Orbiters. The primary continual source of accelerometer data from mission to mission is SAMS. Some of the SAMS data from STS-66 are presented in Appendices B and C to provide PI's with an overview of the environment during mission.

The raw data recorded by SAMS are processed to compensate for temperature and gain related errors of bias, scale factor, and axis misalignment. The processing utilizes a fourth order temperature model to compensate the data and convert the raw digitized data into engineering units (Thomas, et al., 1992). The data are transformed to the shuttle structural coordinate system and formatted into files for distribution via CD-ROM and file server. See Appendix A for information on file server access to SAMS data.

The SAMS data have been further processed to produce the plots shown here. Color spectrograms are provided as an overview of the frequency characteristics of the SAMS data during the mission. Each spectrogram is a two-hour composite of amplitude spectra for consecutive ten second intervals. These plots should be used to identify times when the frequency character of the acceleration environment changes.

The color spectrograms were produced using STS-66 SAMS Head A data. The data were taken in two hour periods and an amplitude spectrum was calculated for consecutive ten second intervals. The frequency bandwidth for the spectra is 0.1 Hz.

The spectral data were scaled by taking the log of each data point and assigning a color to the integer result. Eight colors were used for eight intervals between 1×10^{-7} g and 1×10^{-3} g. In using this method, a range of acceleration values are assigned to the same color.

References

Thomas, J. E., R. B. Peters, B. D. Finley, Space Acceleration Measurement System triaxial head error budget. NASA Technical Memorandum 105300, January 1992.

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Figure C-1 ATLAS-3 Locker Door MF28E, Vector Magnitude

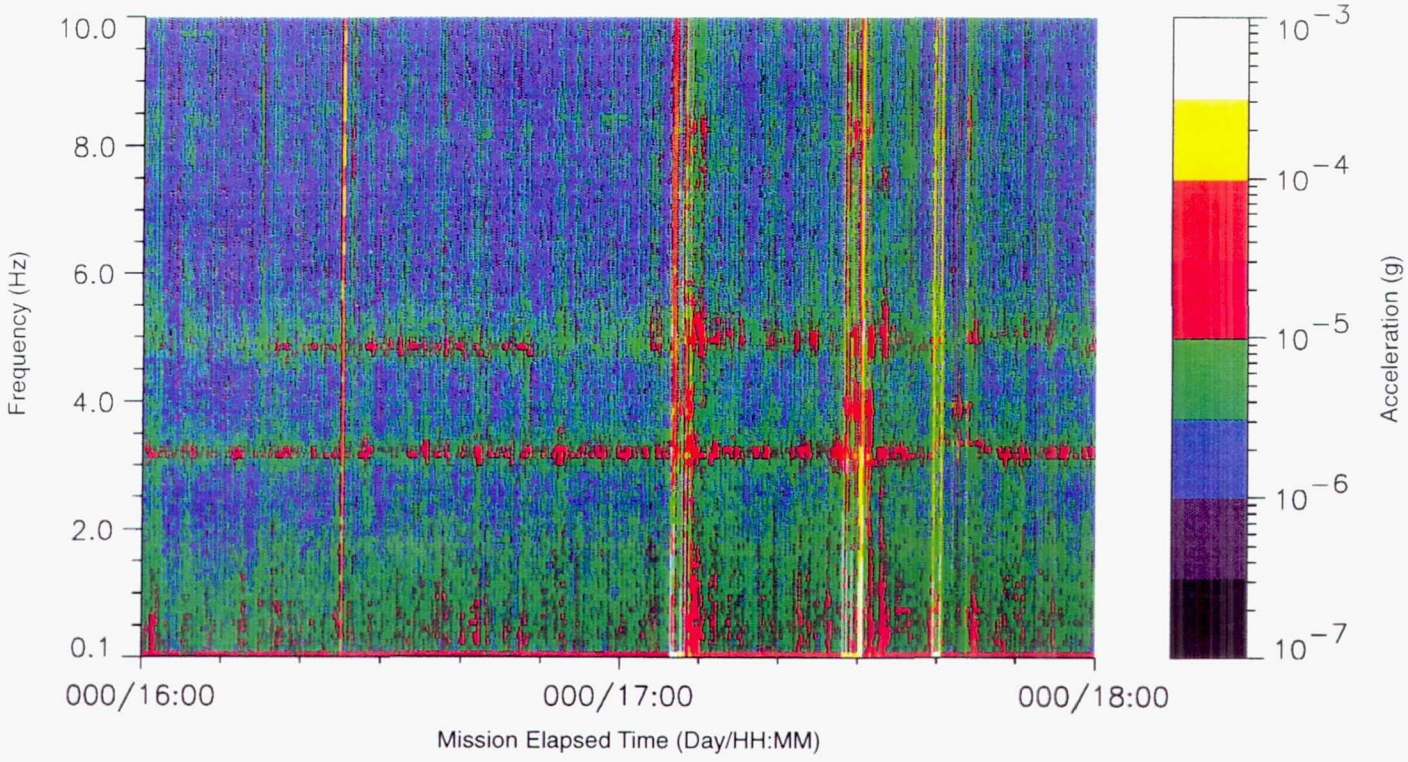

Figure C-2 ATLAS-3 Locker Door MF28E, Vector Magnitude

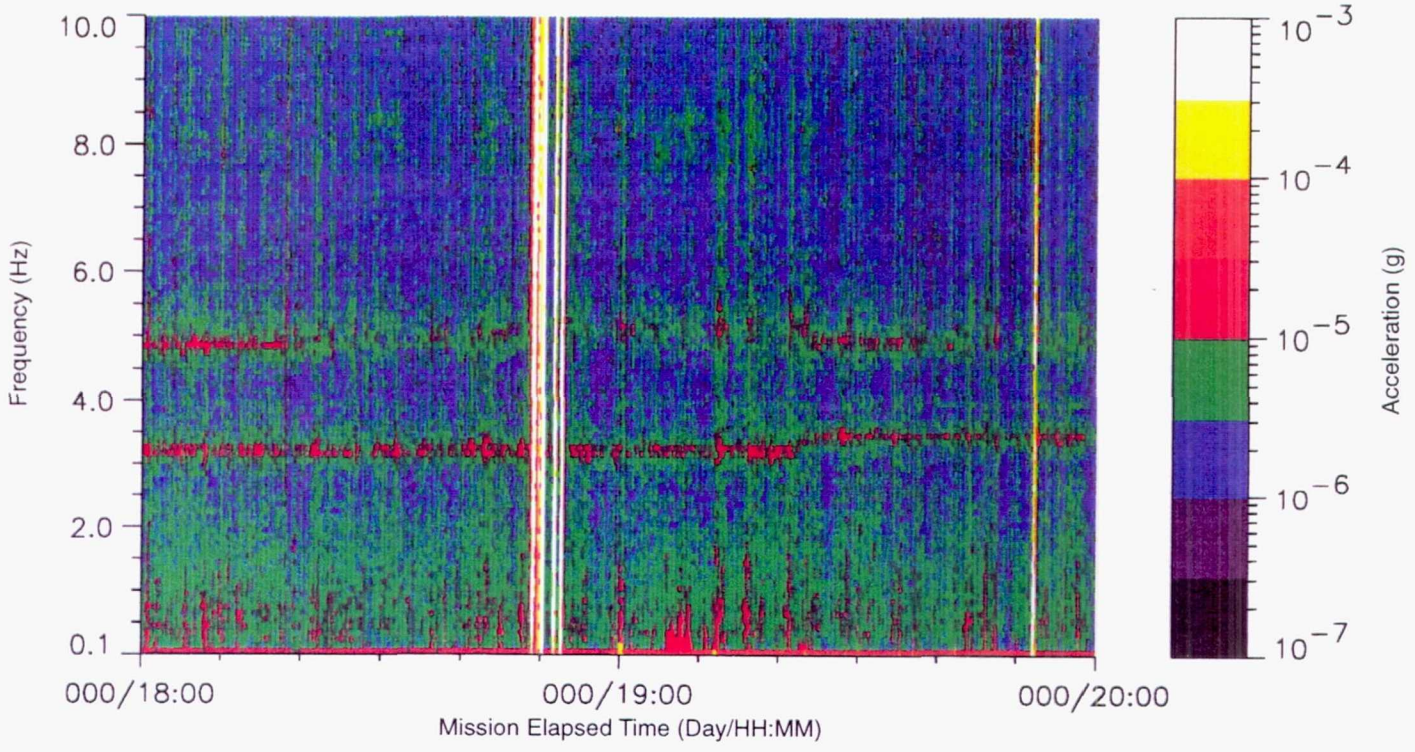

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Figure C-3 ATLAS-3 Locker Door MF28E, Vector Magnitude

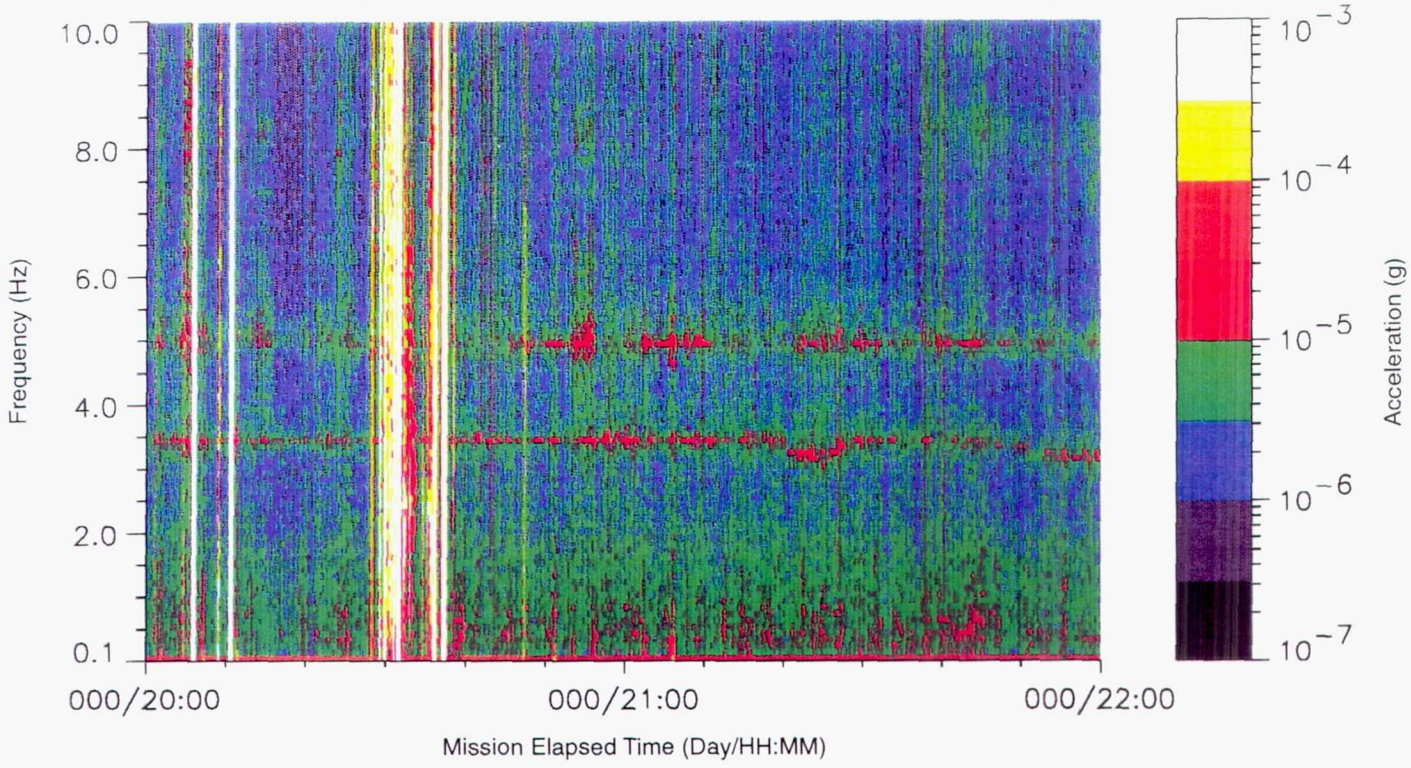

Figure C-4 ATLAS-3 Locker Door MF28E, Vector Magnitude

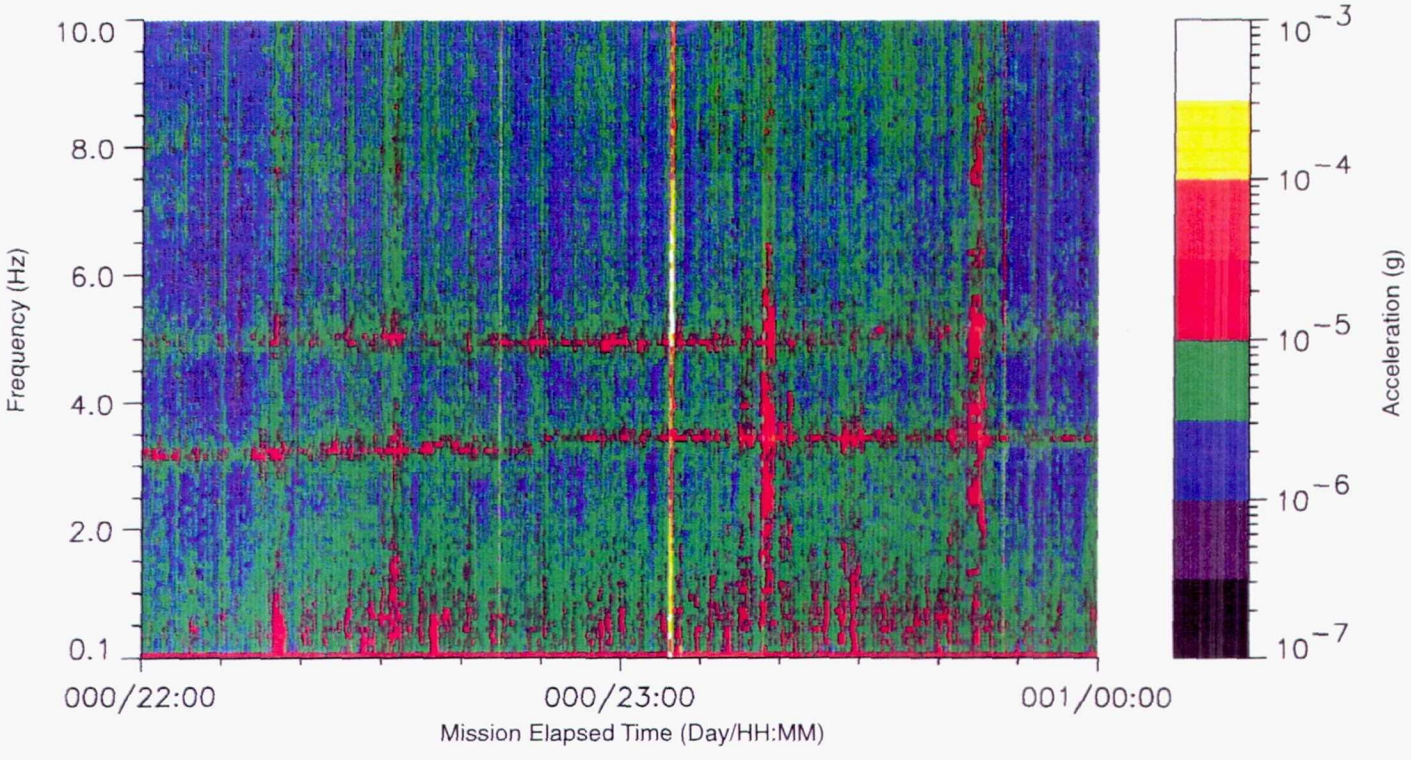

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Figure C-5 ATLAS-3 Locker Door MF28E, Vector Magnitude

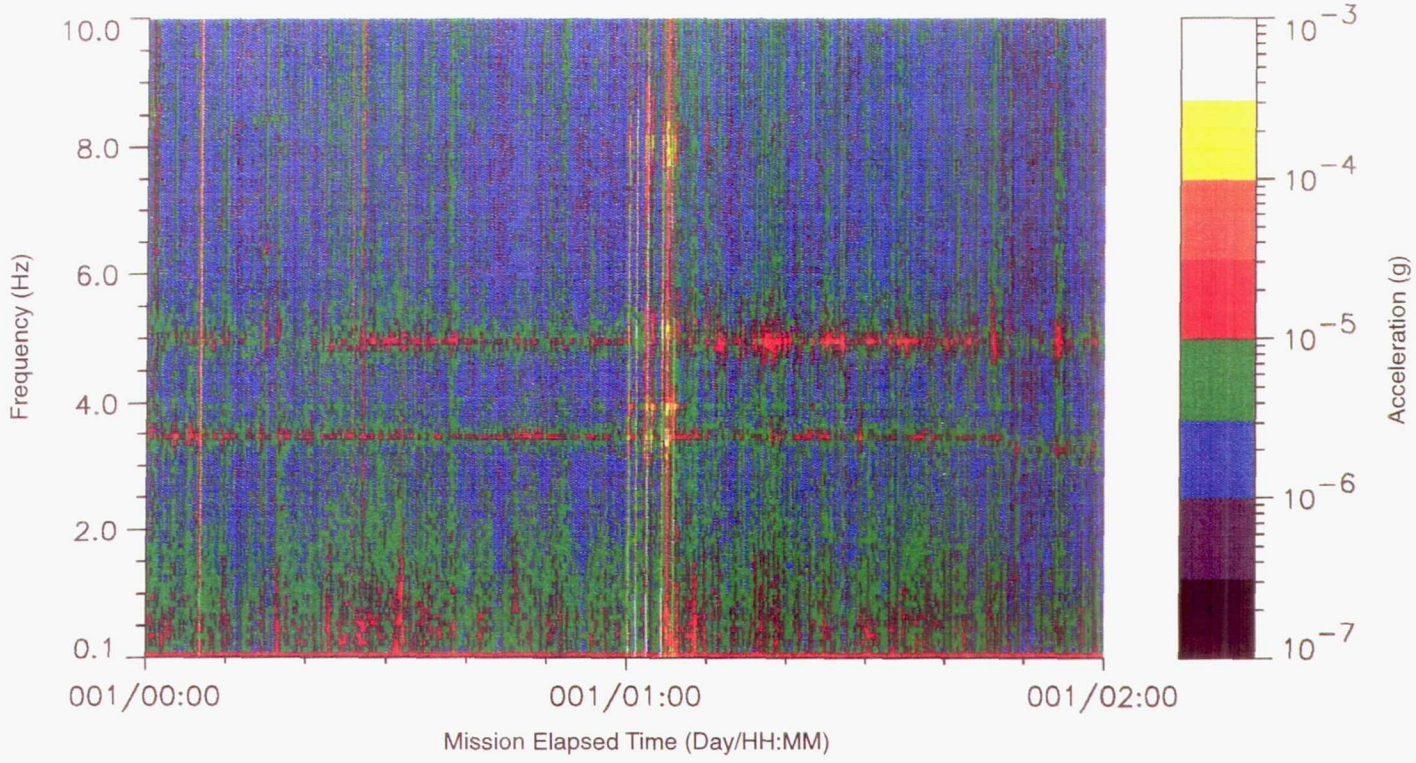

Figure C-6 ATLAS-3 Locker Door MF28E, Vector Magnitude

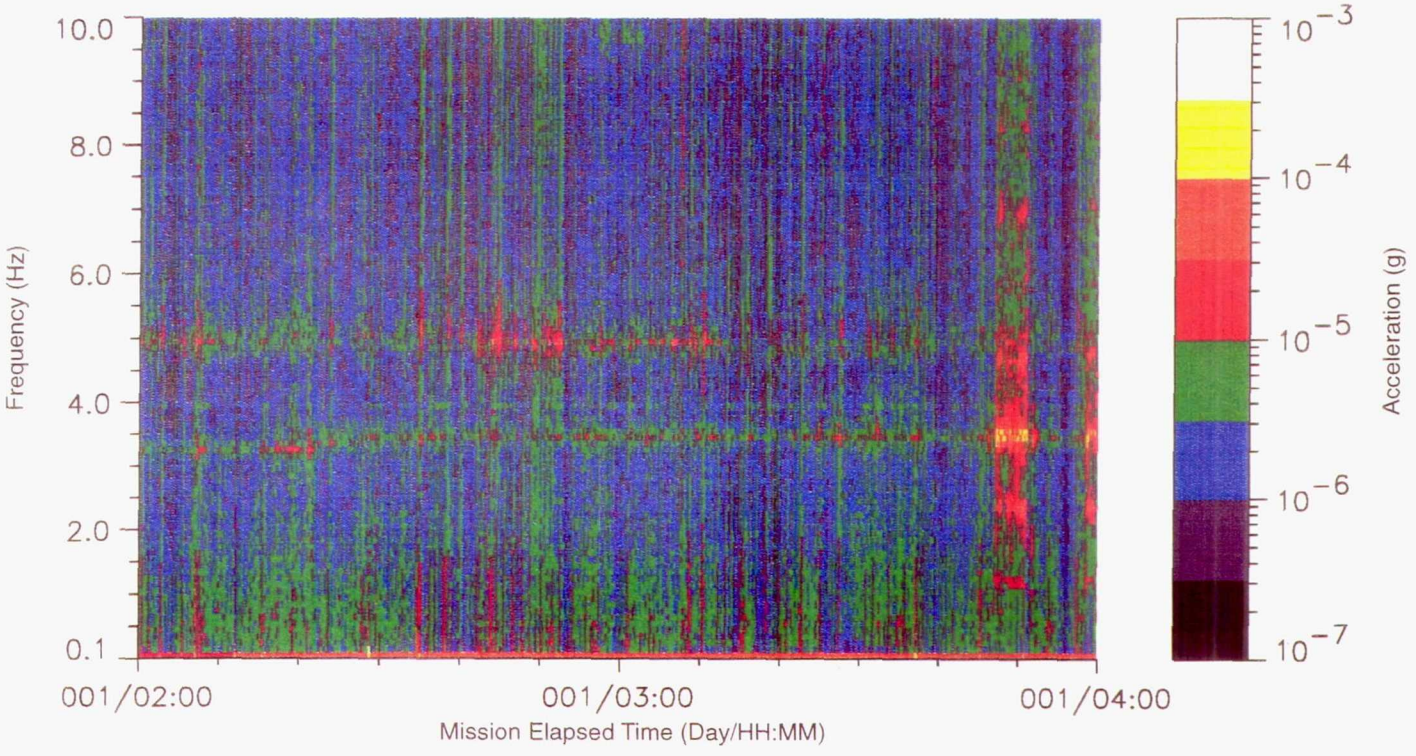

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Figure C-7 ATLAS-3 Locker Door MF28E, Vector Magnitude

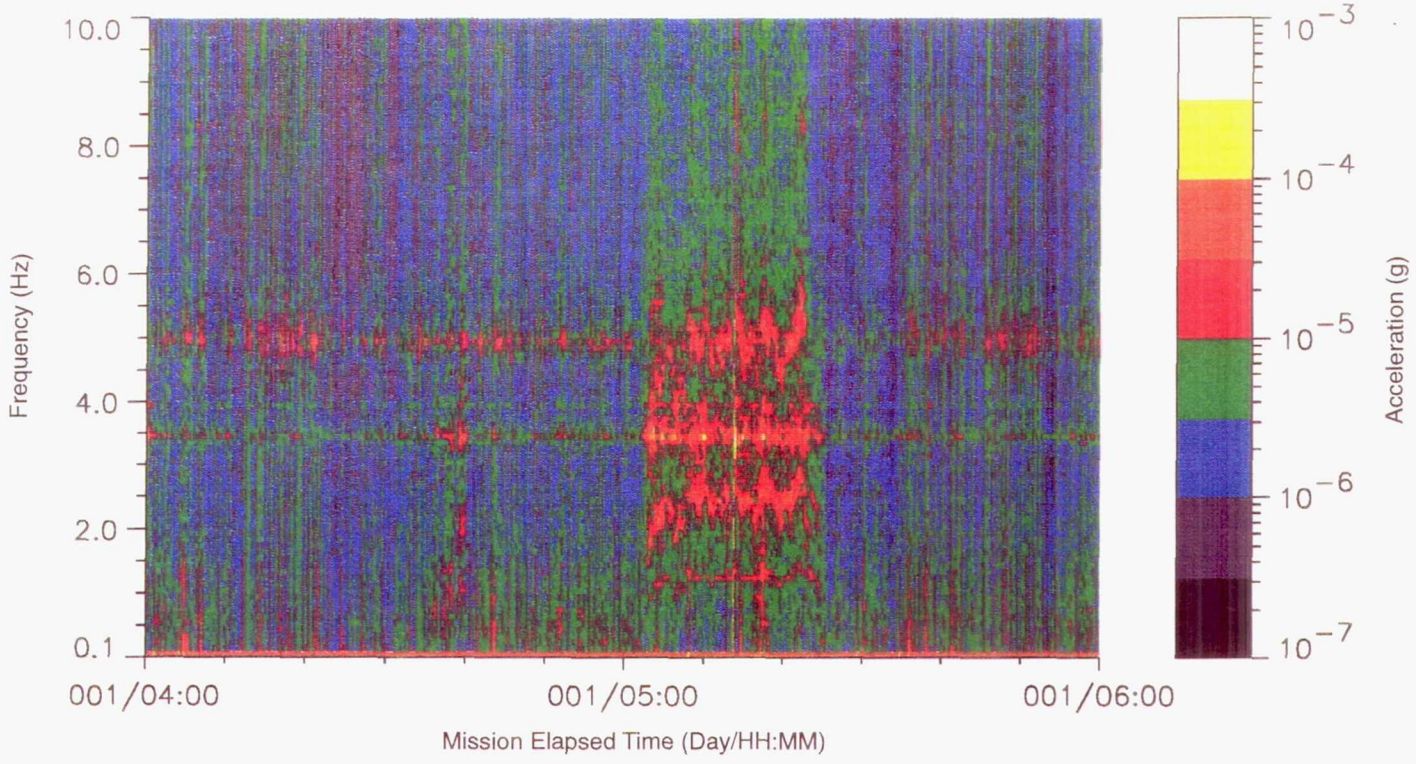

Figure C-8 ATLAS-3 Locker Door MF28E, Vector Magnitude

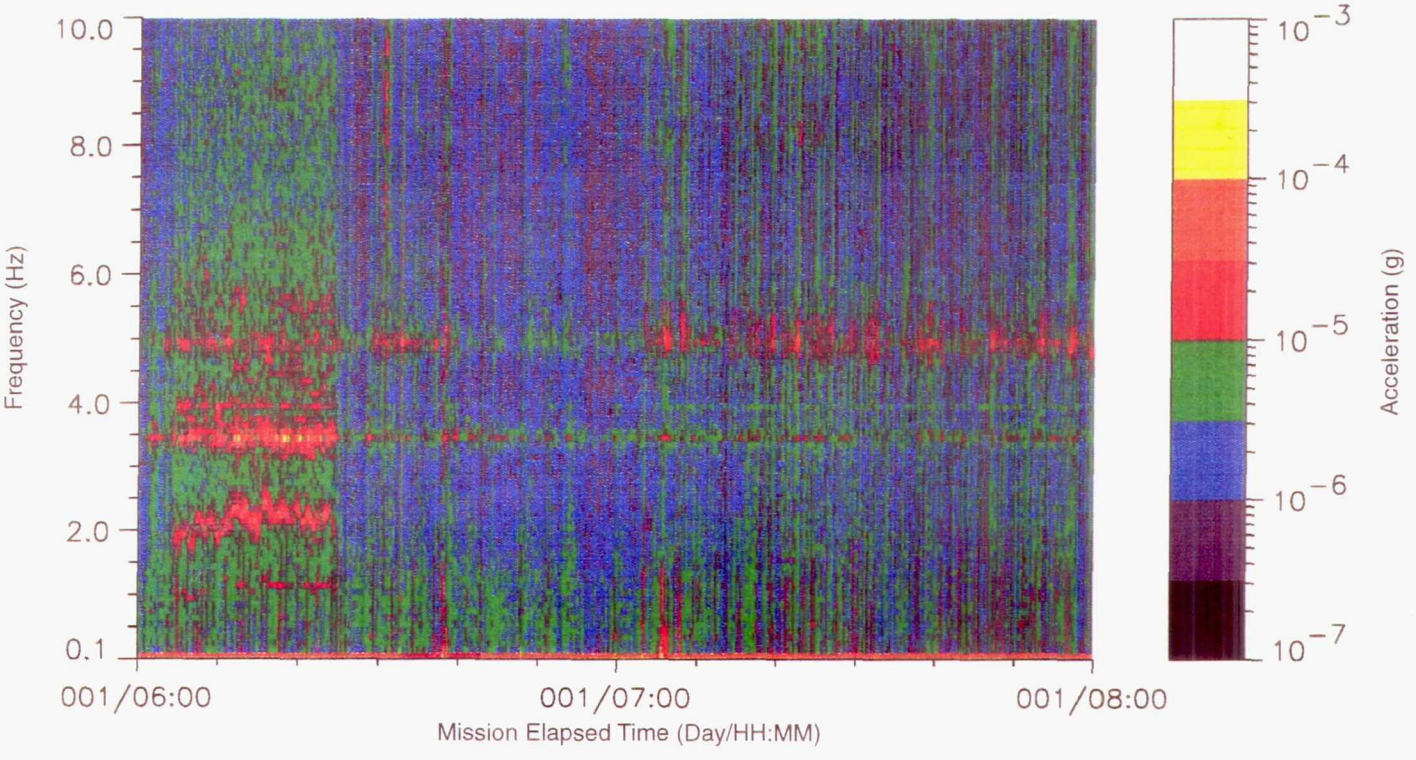

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Figure C-9 ATLAS-3 Locker Door MF28E, Vector Magnitude

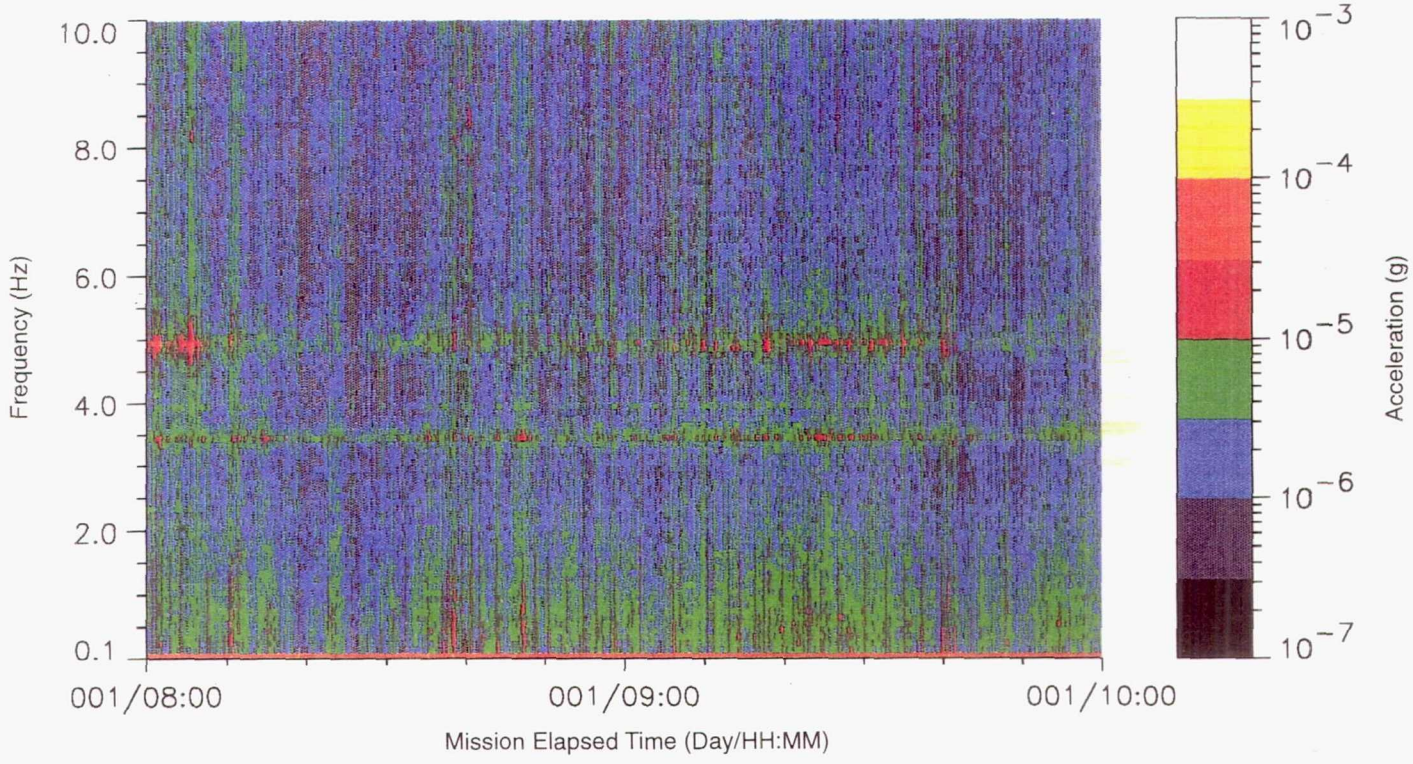

Figure C-10 ATLAS-3 Locker Door MF28E, Vector Magnitude

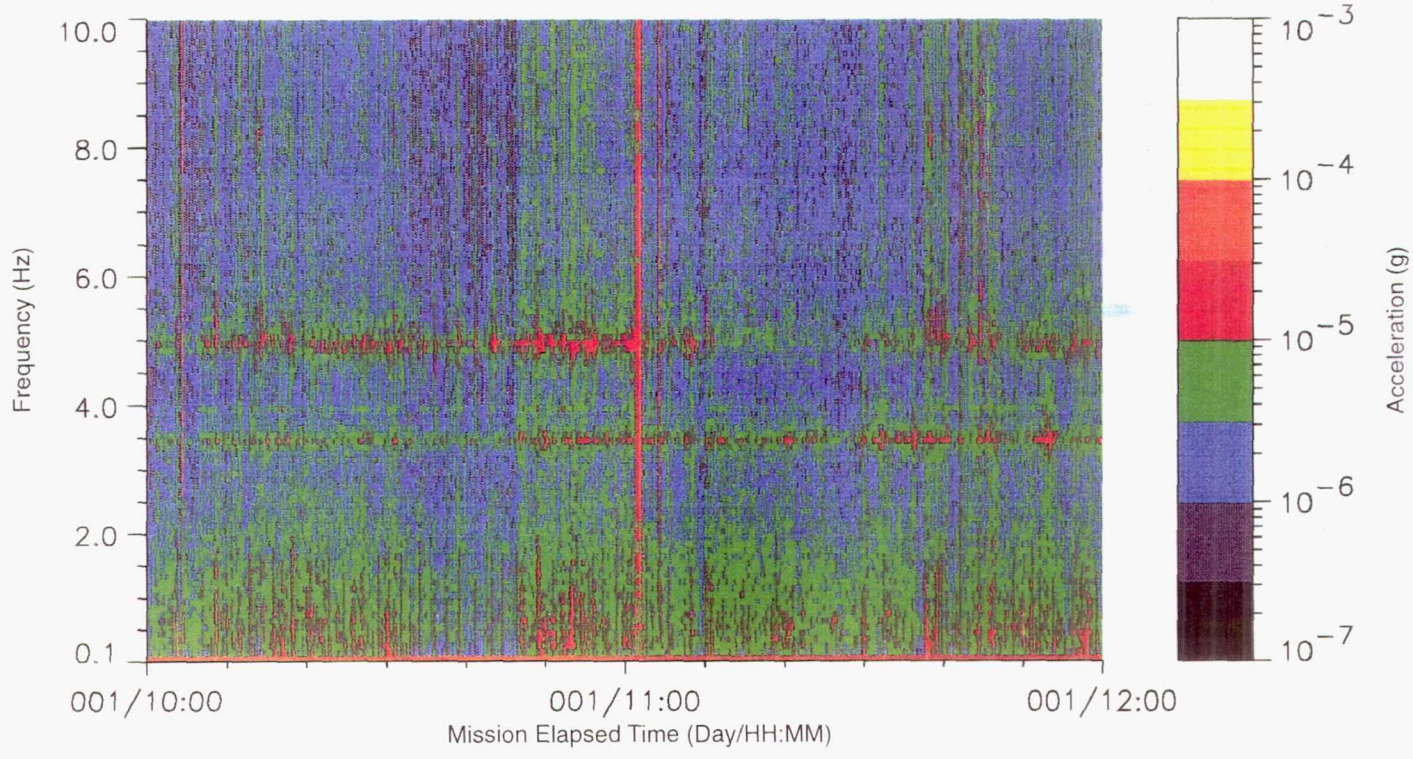

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Figure C-11 ATLAS-3 Locker Door MF28E, Vector Magnitude

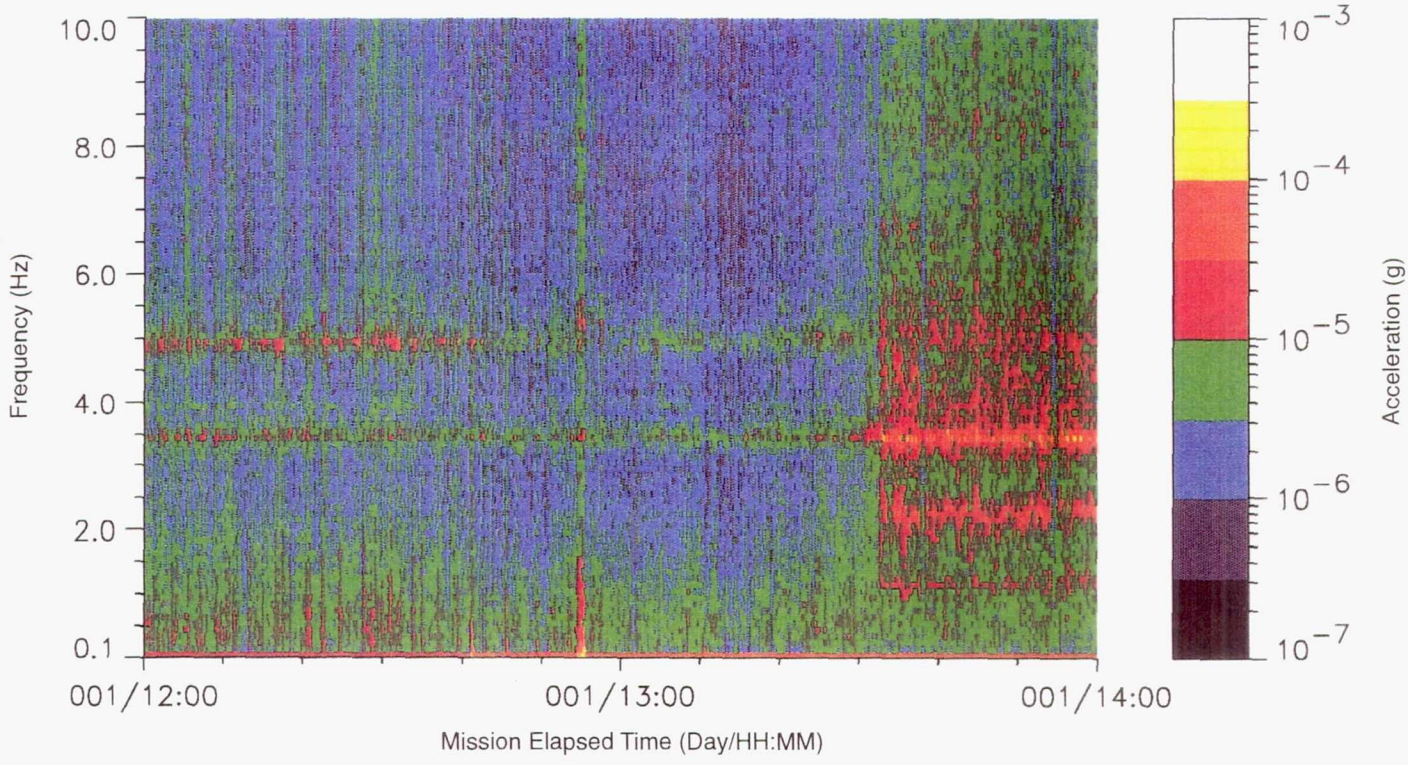

Figure C-12 ATLAS-3 Locker Door MF28E, Vector Magnitude

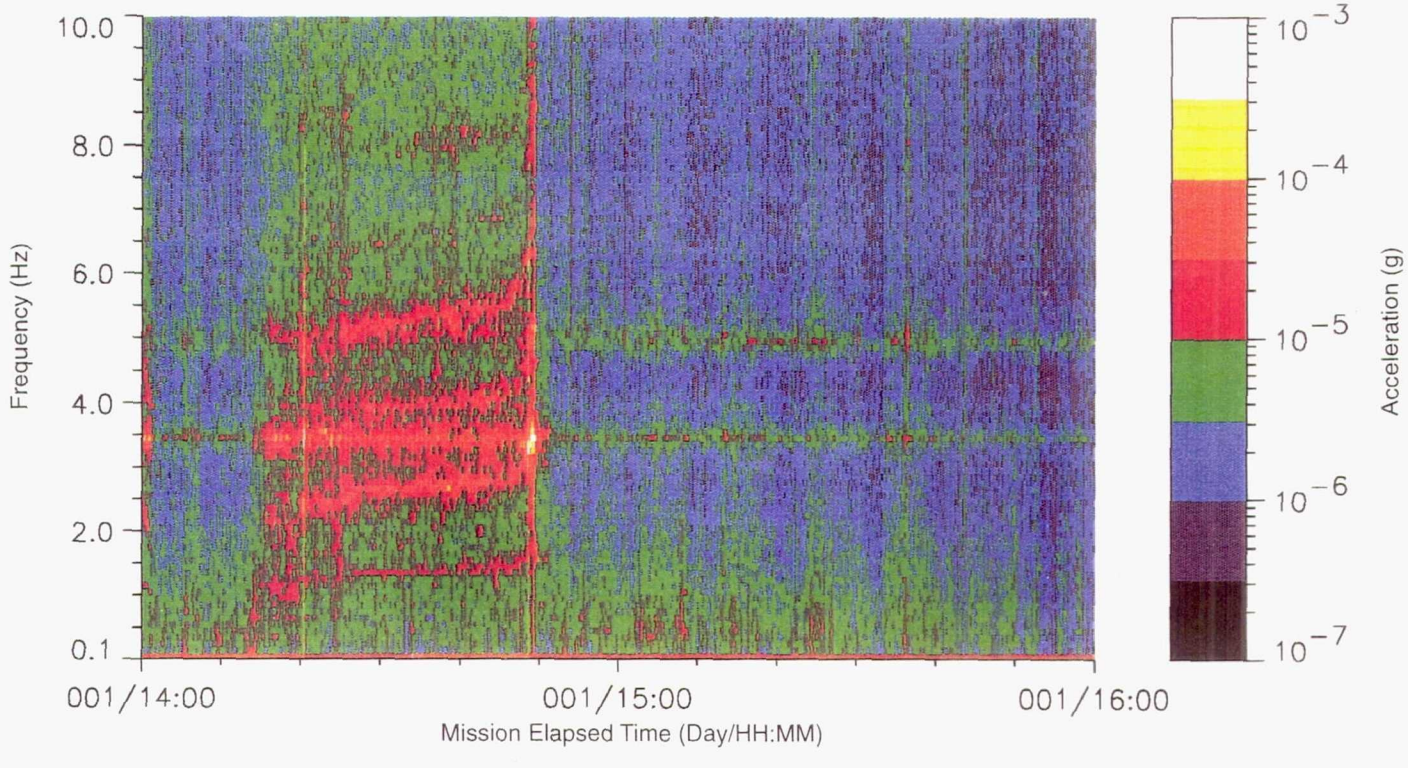

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Figure C-13 ATLAS-3 Locker Door MF28E, Vector Magnitude

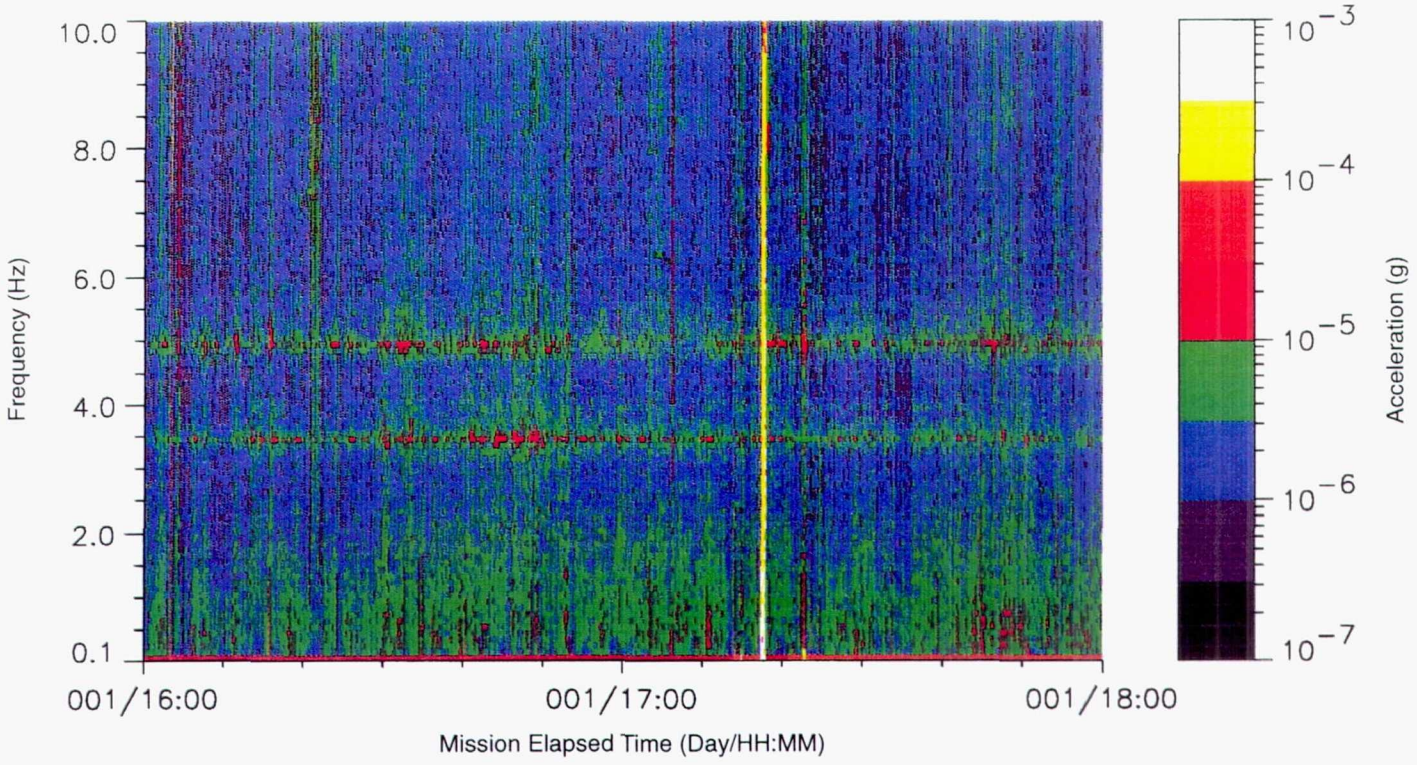

Figure C-14 ATLAS-3 Locker Door MF28E, Vector Magnitude

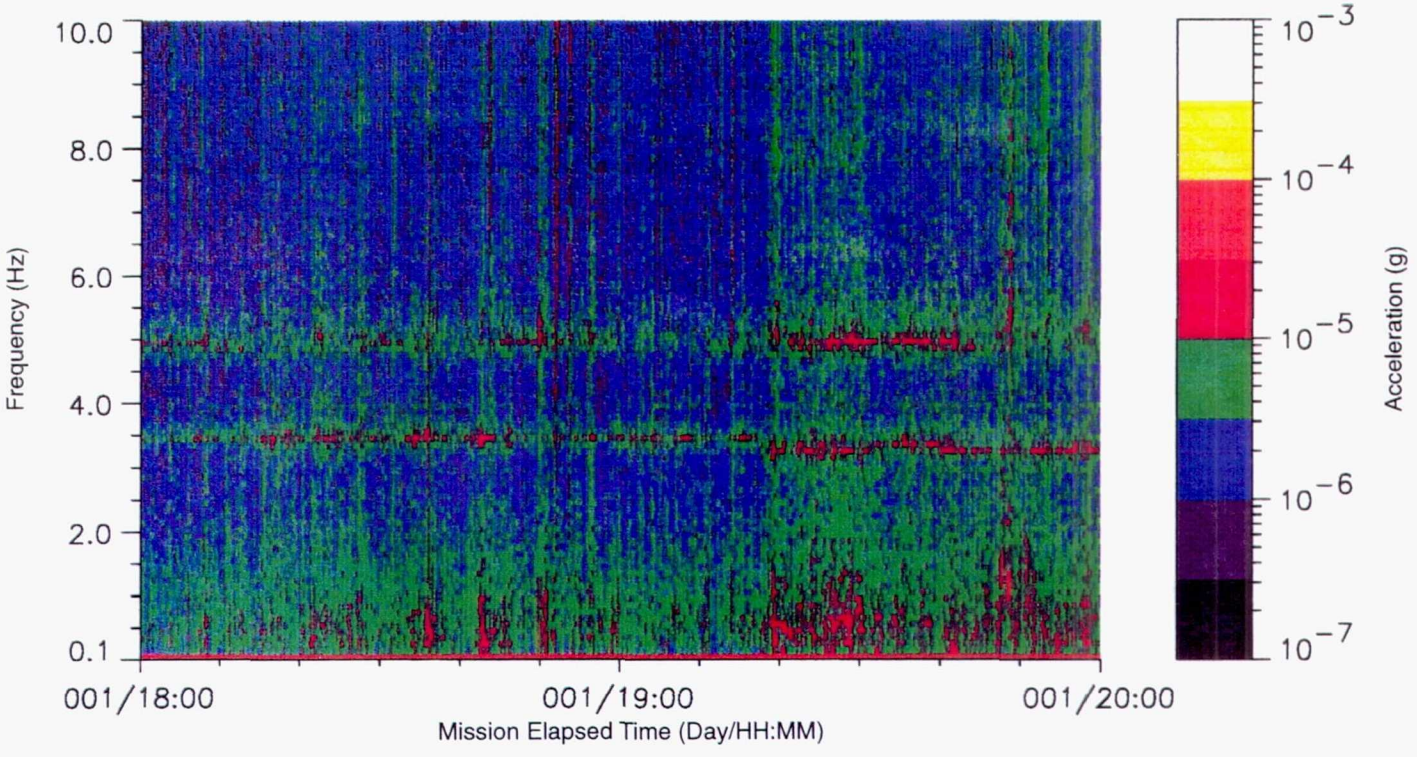

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Figure C-15 ATLAS-3 Locker Door MF28E, Vector Magnitude

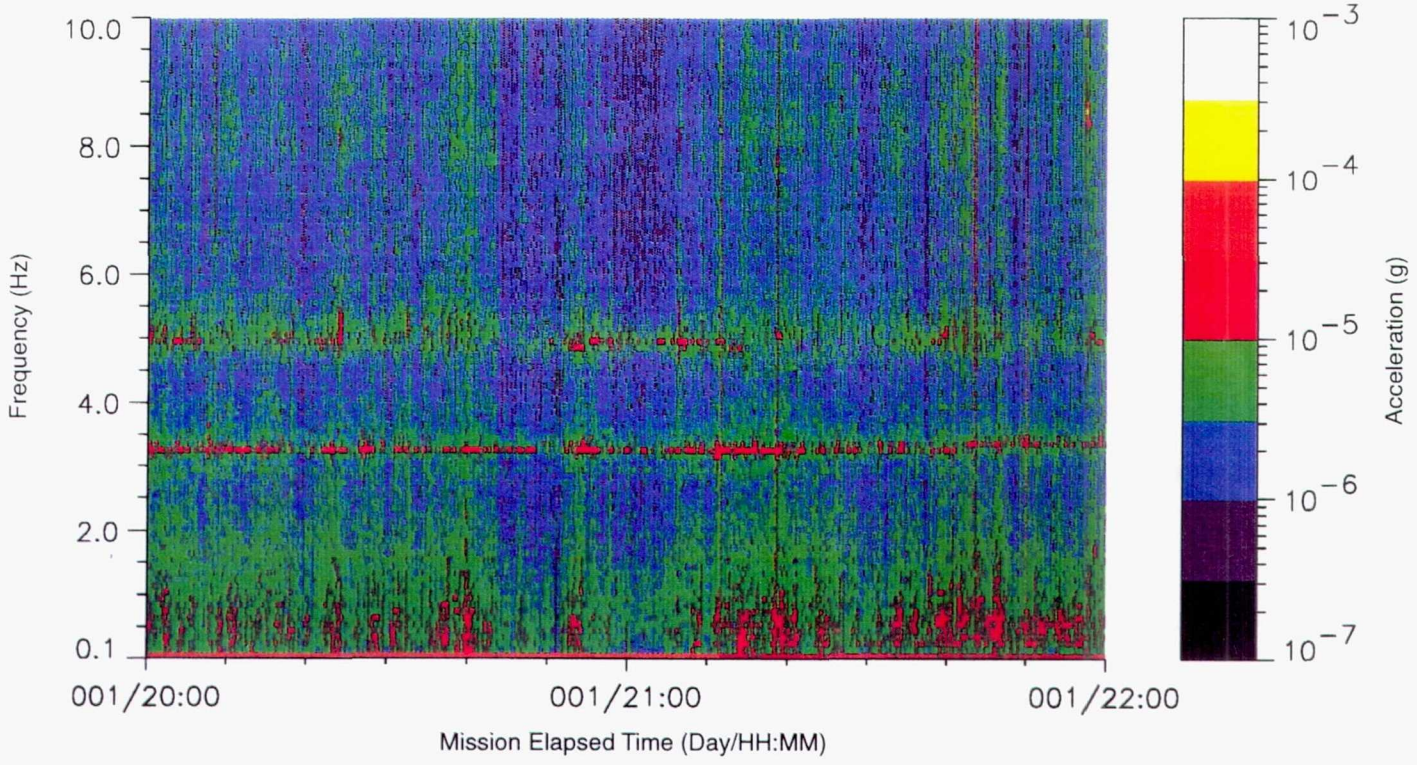

Figure C-16 ATLAS-3 Locker Door MF28E, Vector Magnitude

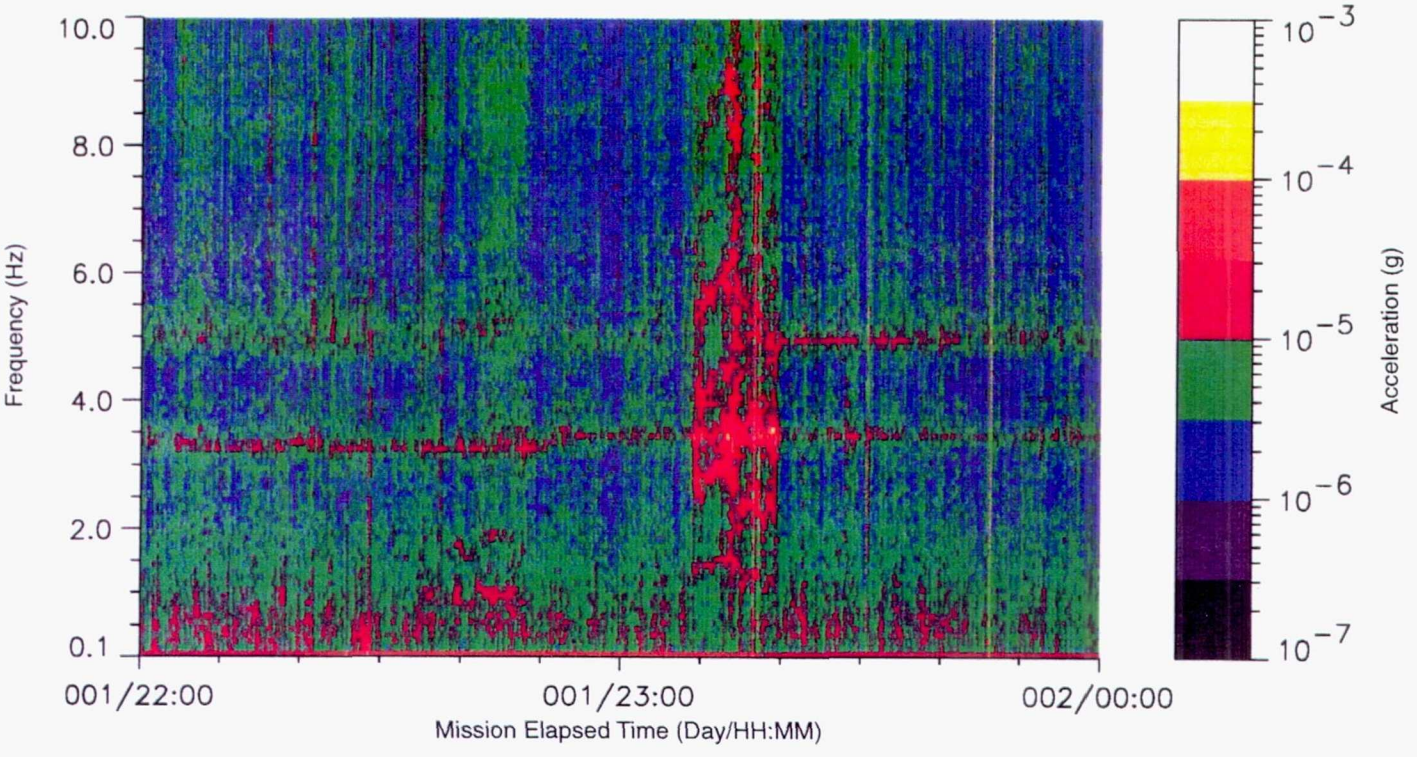

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Figure C-17 ATLAS-3 Locker Door MF28E, Vector Magnitude

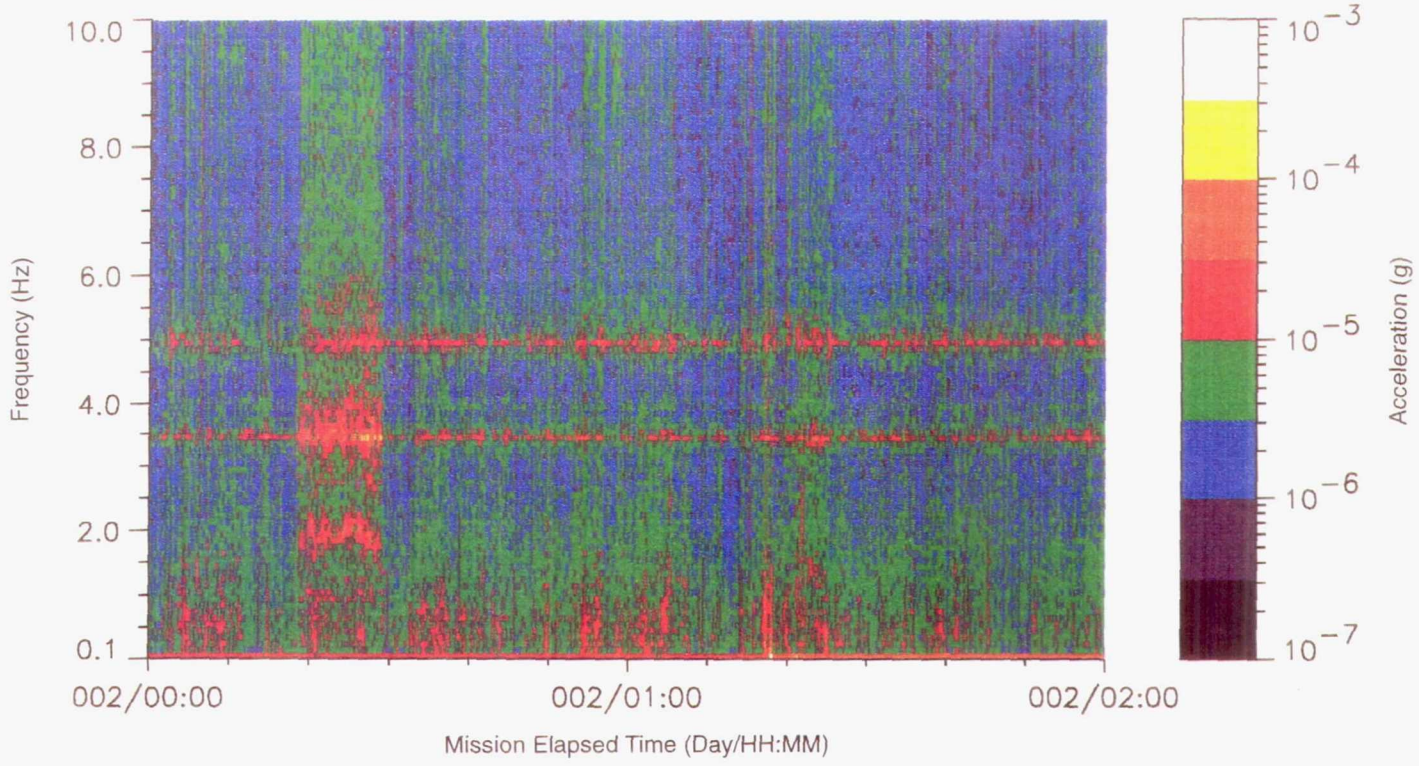

Figure C-18 ATLAS-3 Locker Door MF28E, Vector Magnitude

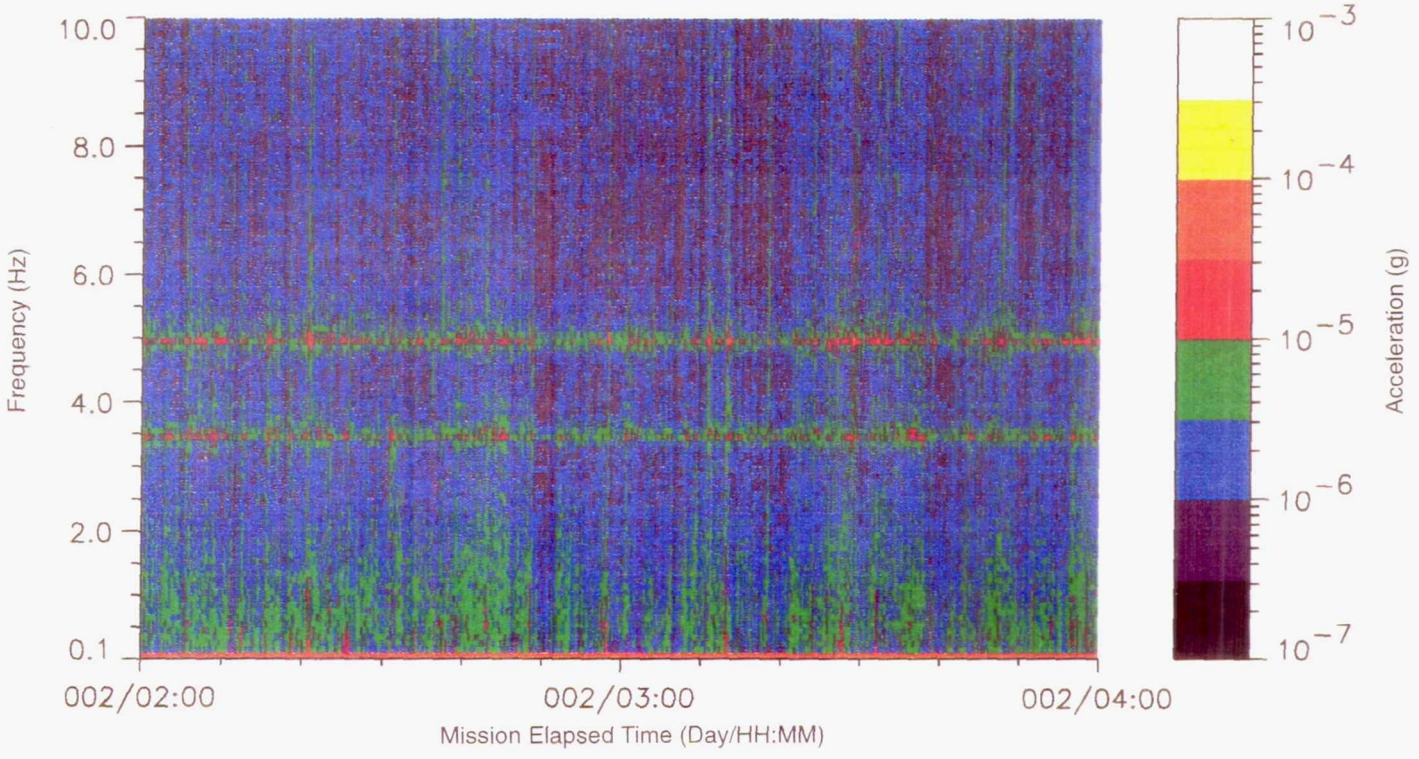

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Figure C-19 ATLAS-3 Locker Door MF28E, Vector Magnitude

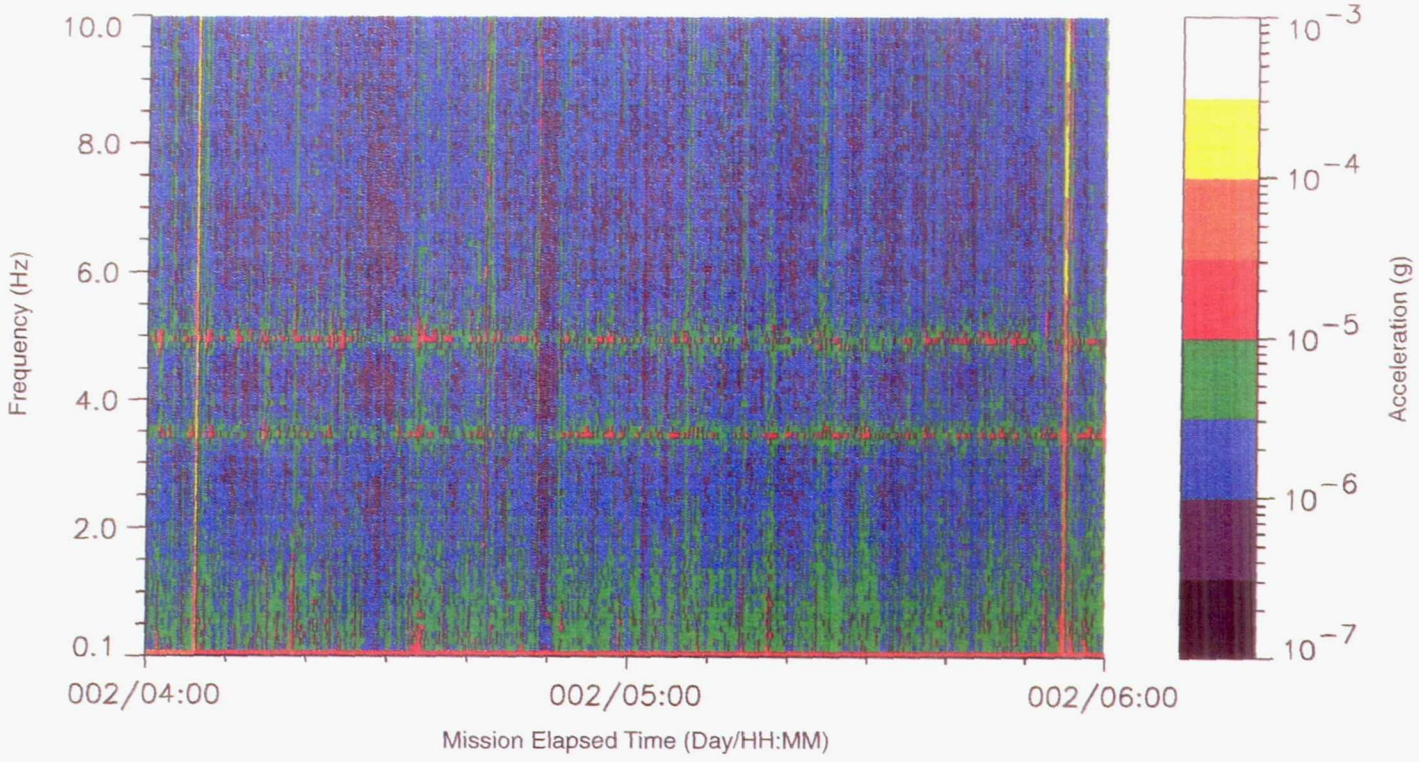

Figure C-20 ATLAS-3 Locker Door MF28E, Vector Magnitude

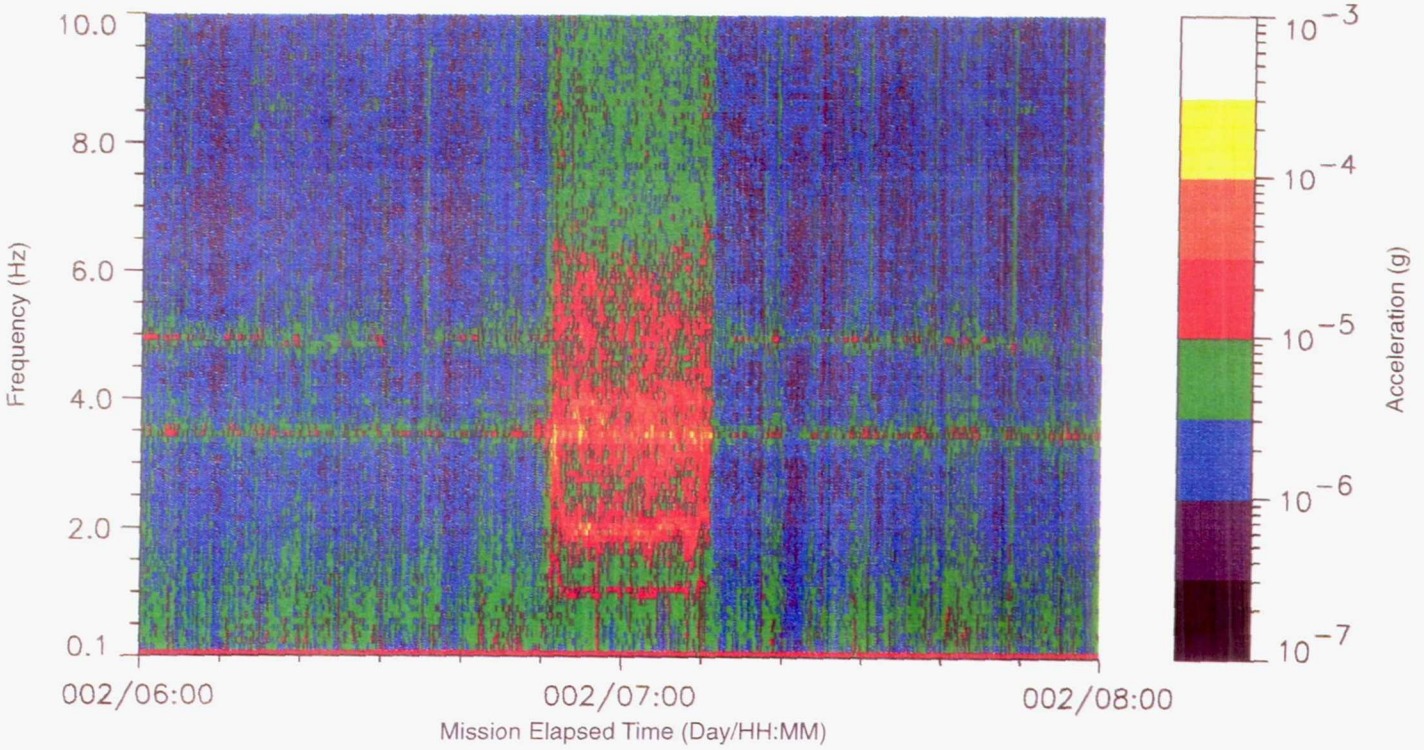

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Figure C-21 ATLAS-3 Locker Door MF28E, Vector Magnitude

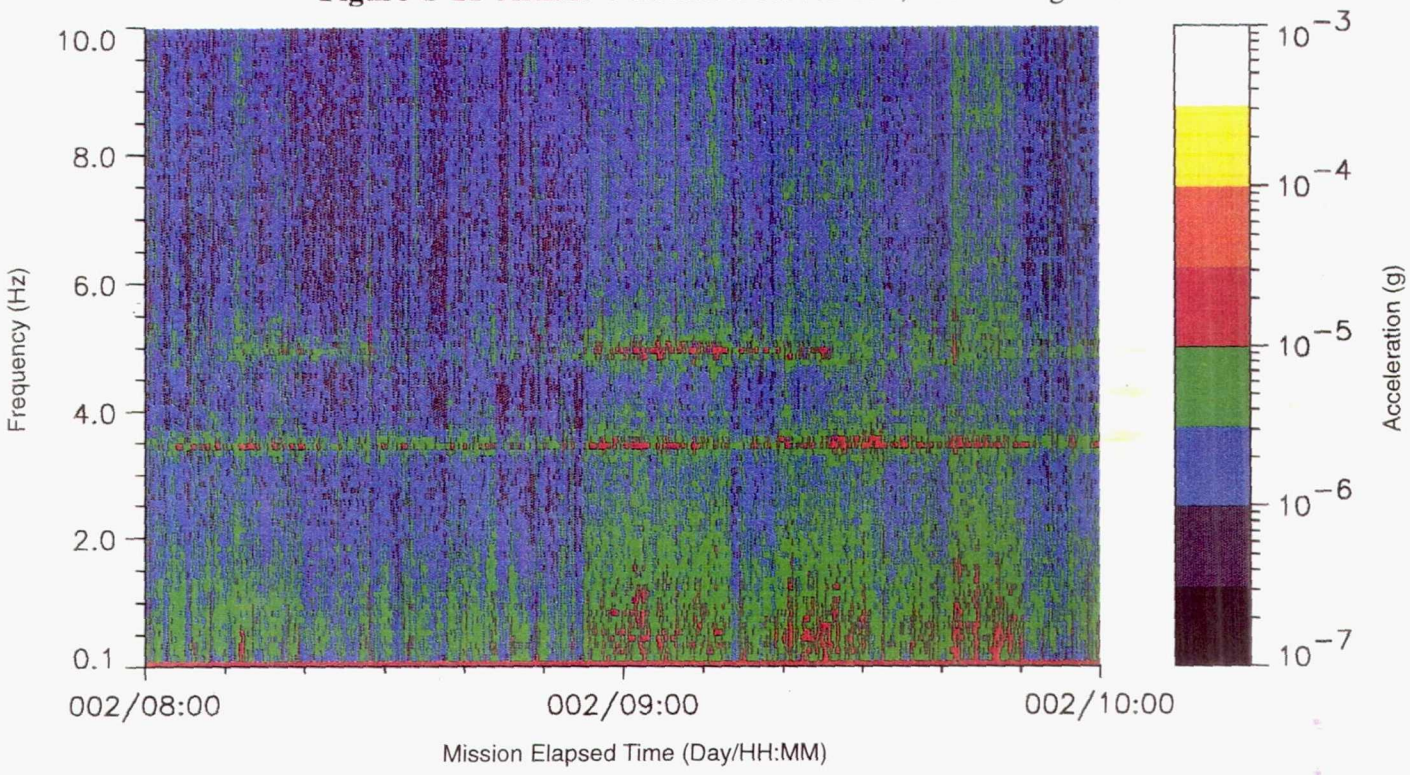

Figure C-22 ATLAS-3 Locker Door MF28E, Vector Magnitude

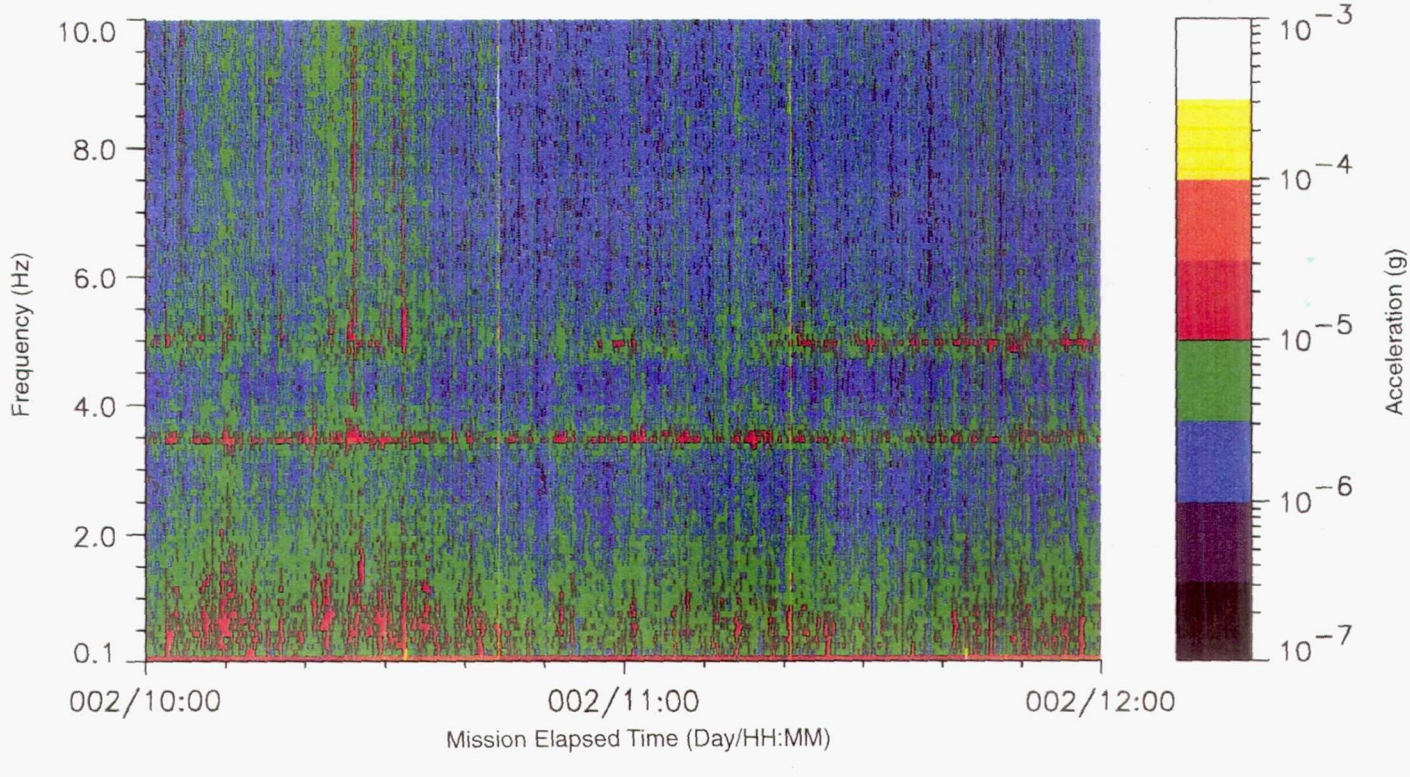

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Figure C-23 ATLAS-3 Locker Door MF28E, Vector Magnitude

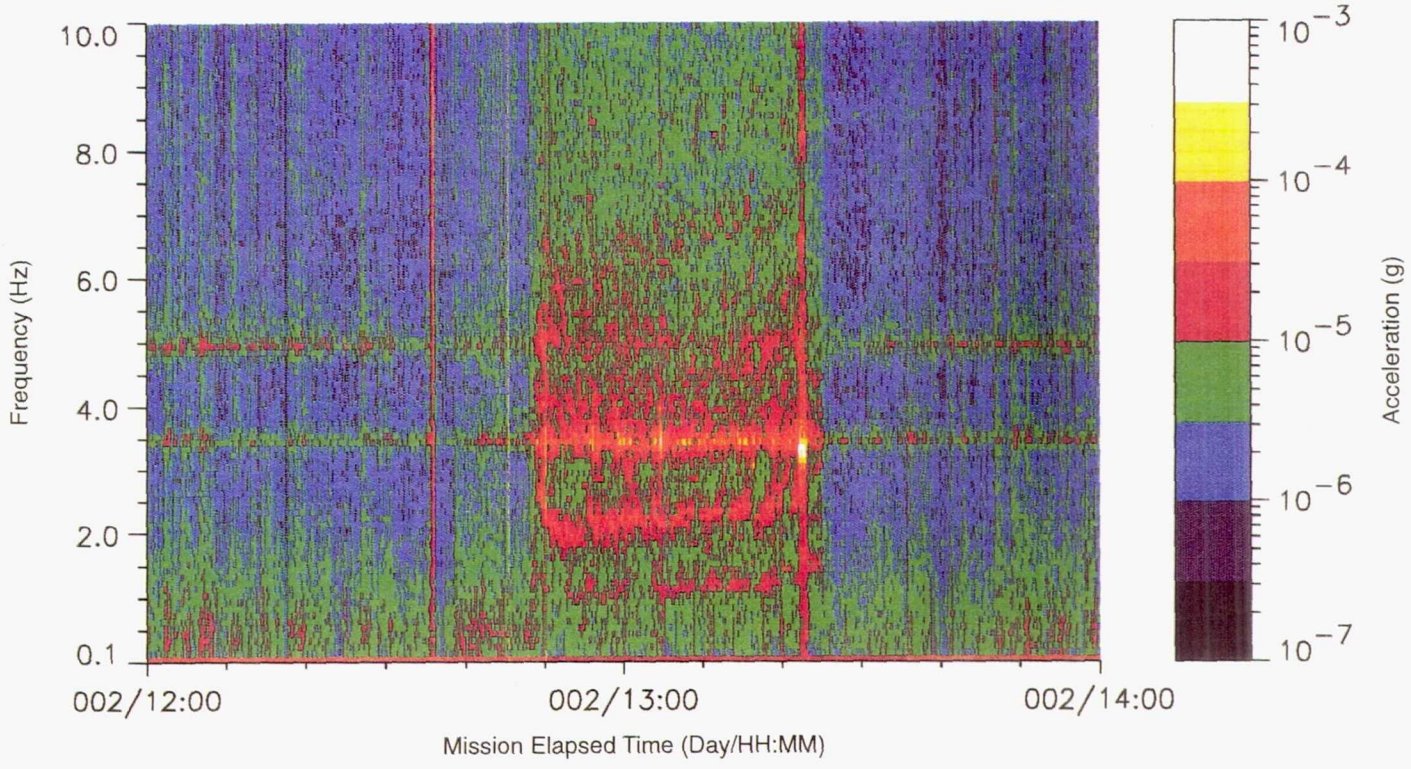

Figure C-24 ATLAS-3 Locker Door MF28E, Vector Magnitude

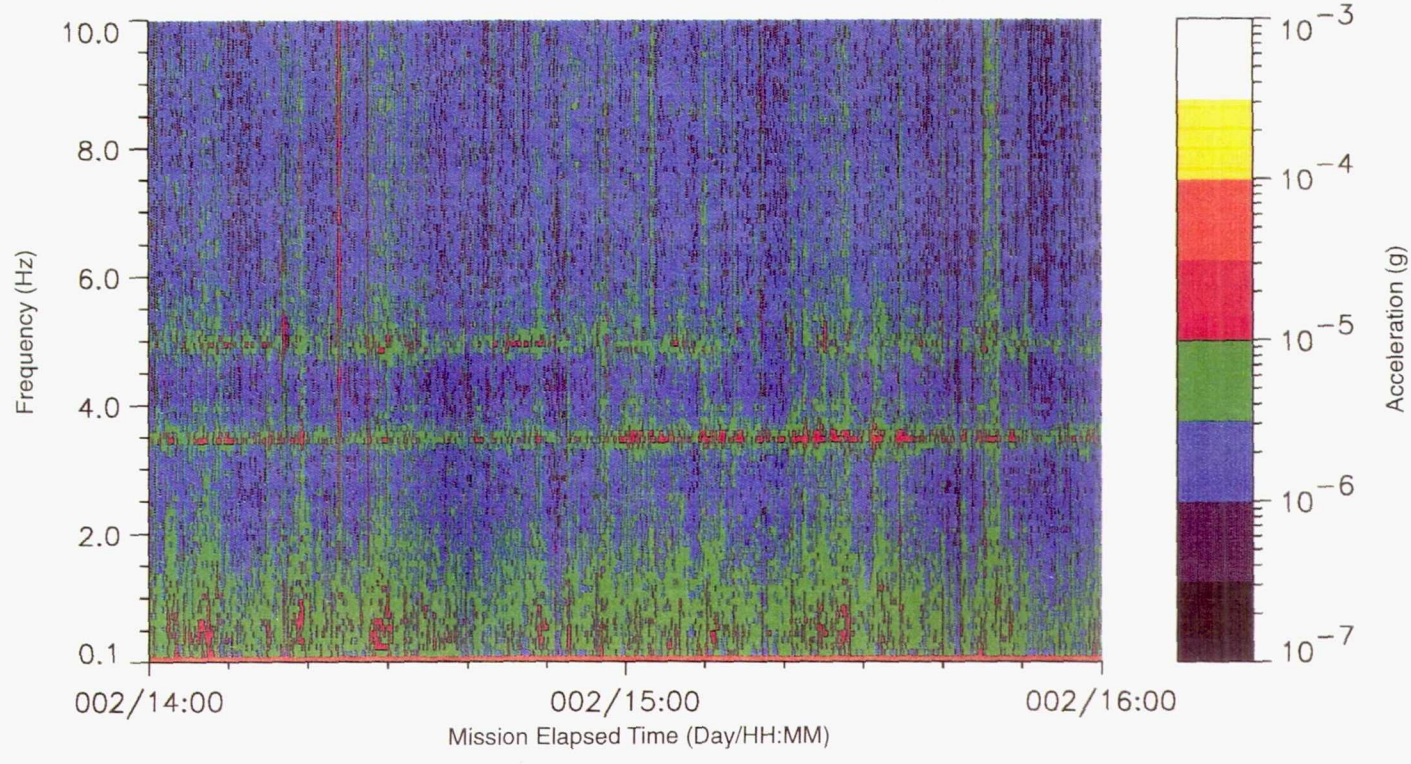

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Figure C-25 ATLAS-3 Locker Door MF28E, Vector Magnitude

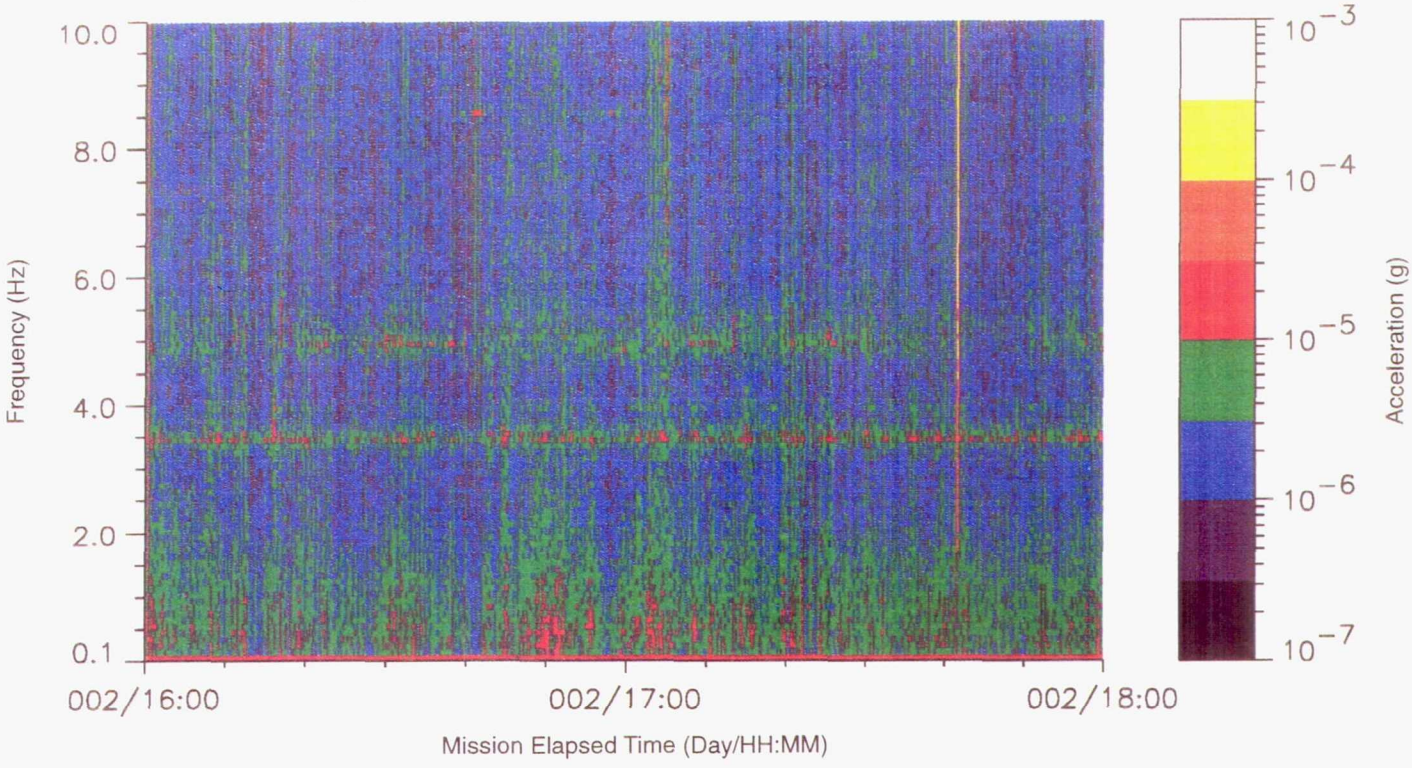

Figure C-26 ATLAS-3 Locker Door MF28E, Vector Magnitude

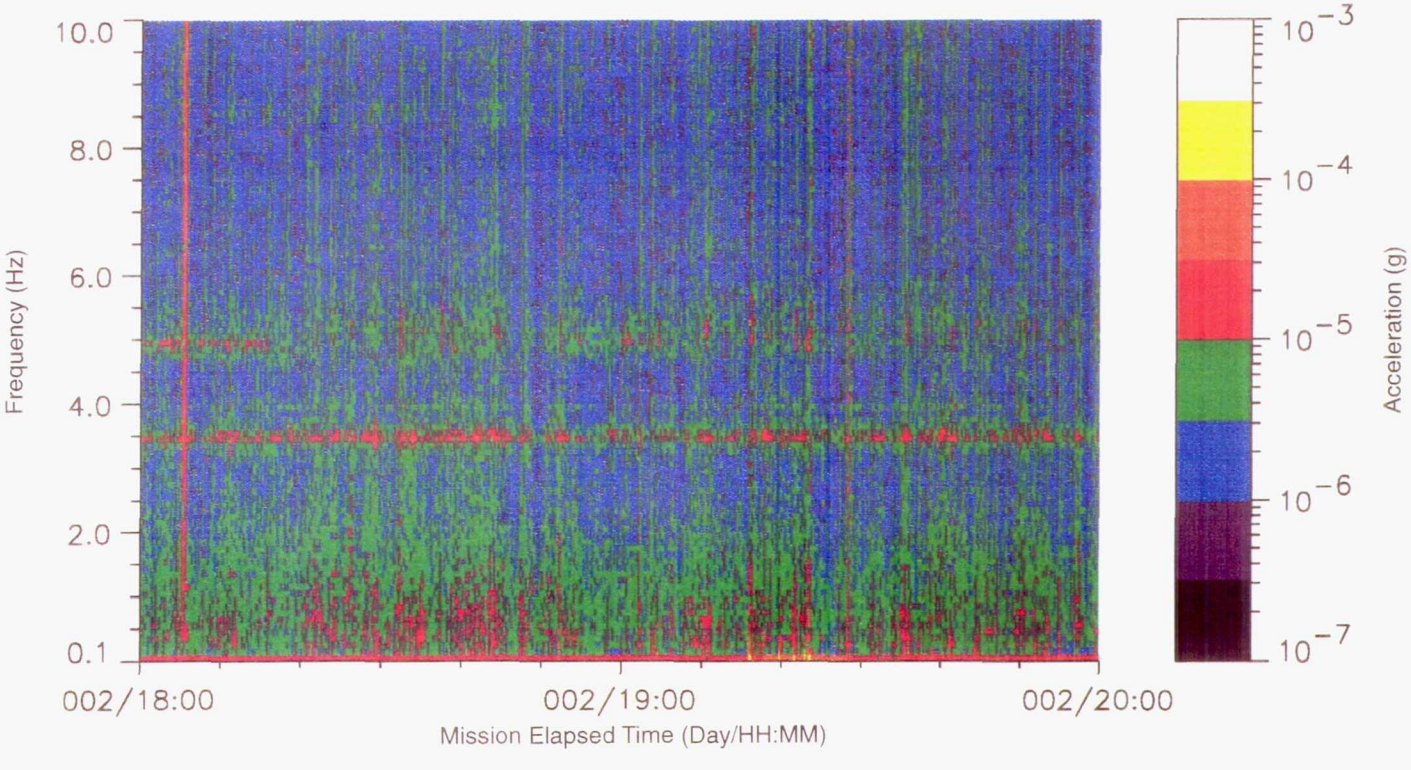

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Figure C-27 ATLAS-3 Locker Door MF28E, Vector Magnitude

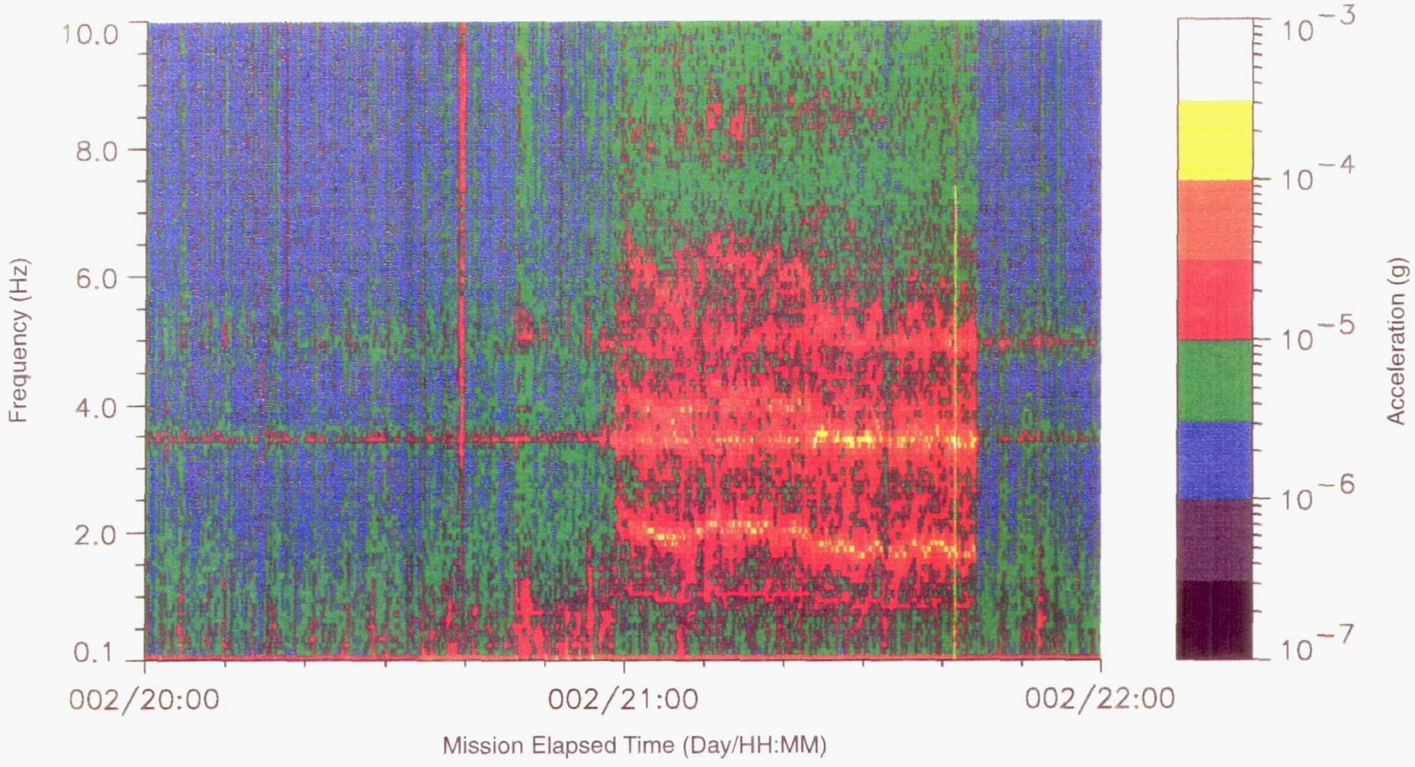

Figure C-28 ATLAS-3 Locker Door MF28E, Vector Magnitude

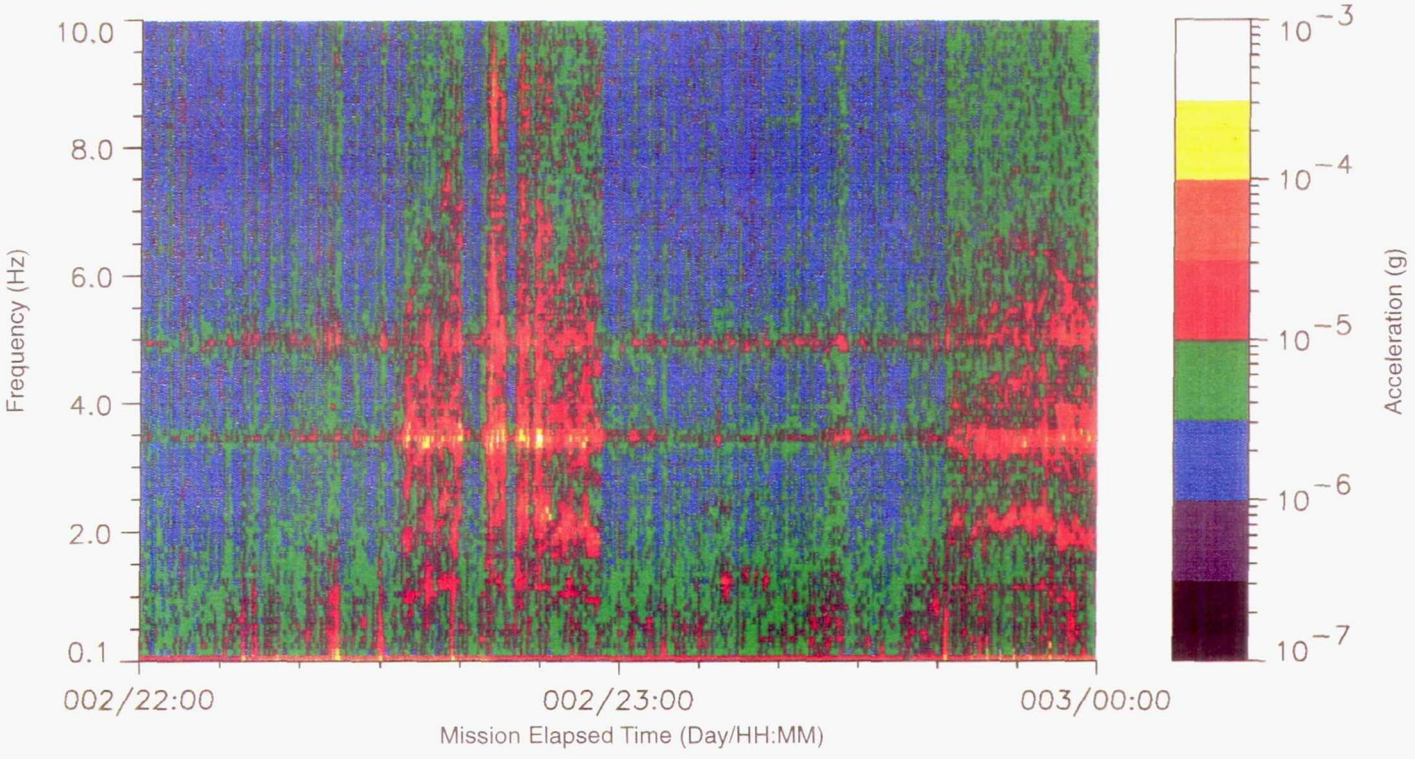

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Figure C-29 ATLAS-3 Locker Door MF28E, Vector Magnitude

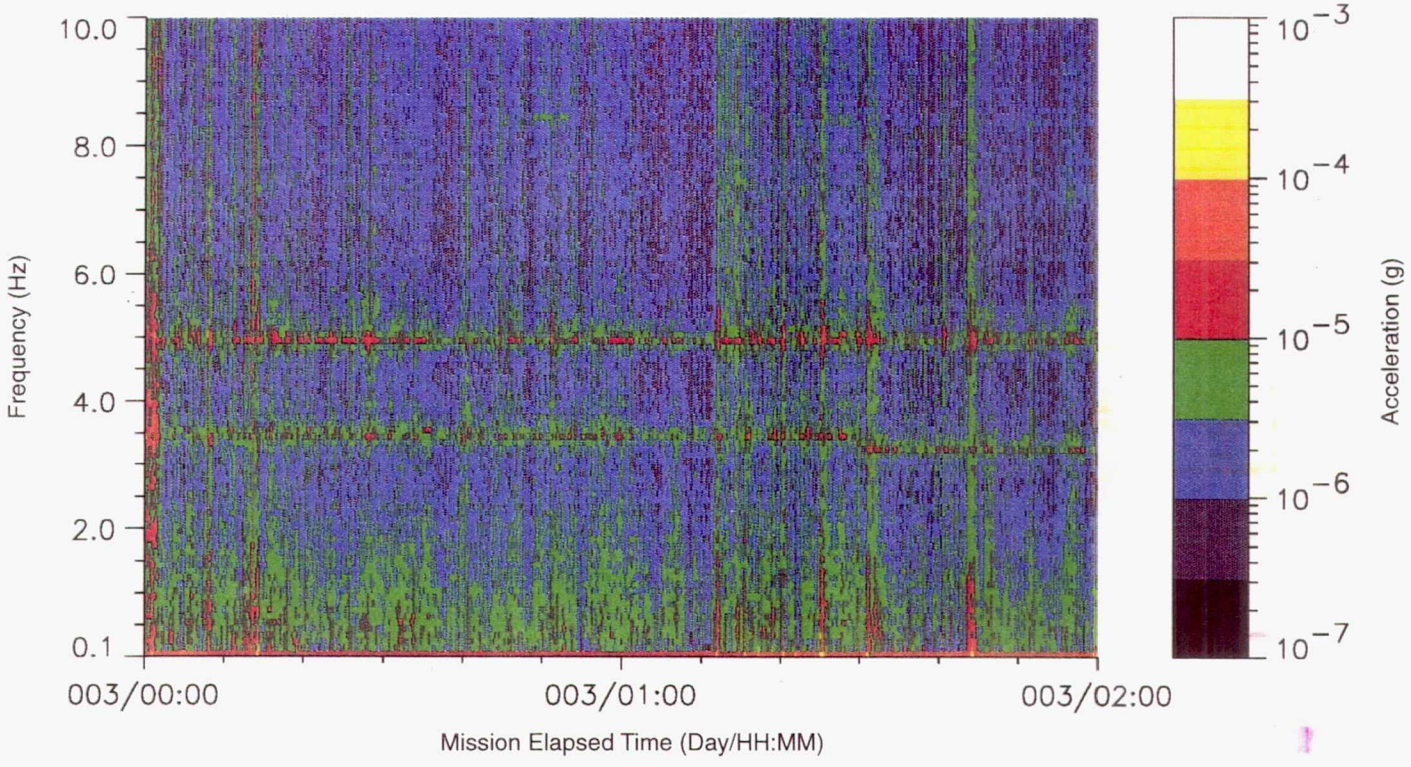

Figure C-30 ATLAS-3 Locker Door MF28E, Vector Magnitude

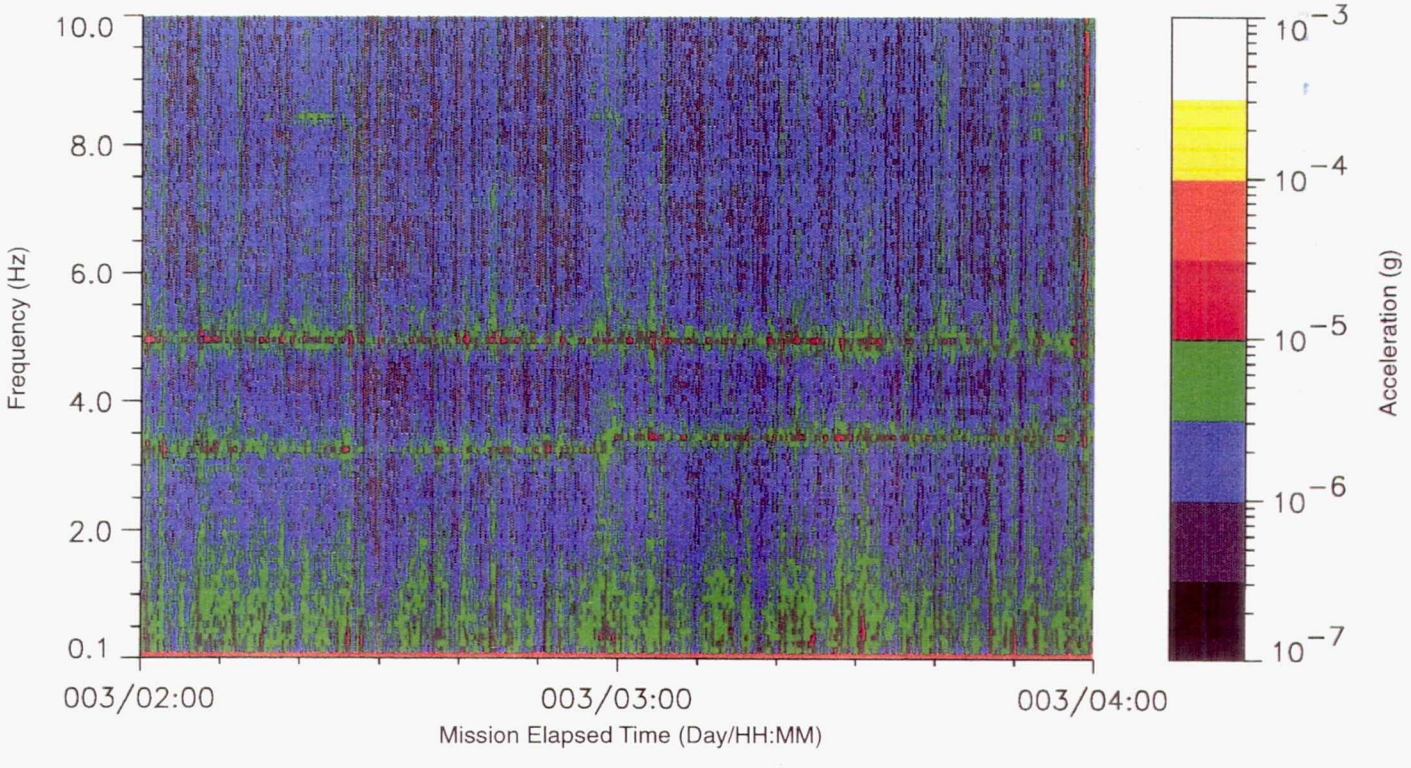

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Figure C-31 ATLAS-3 Locker Door MF28E, Vector Magnitude

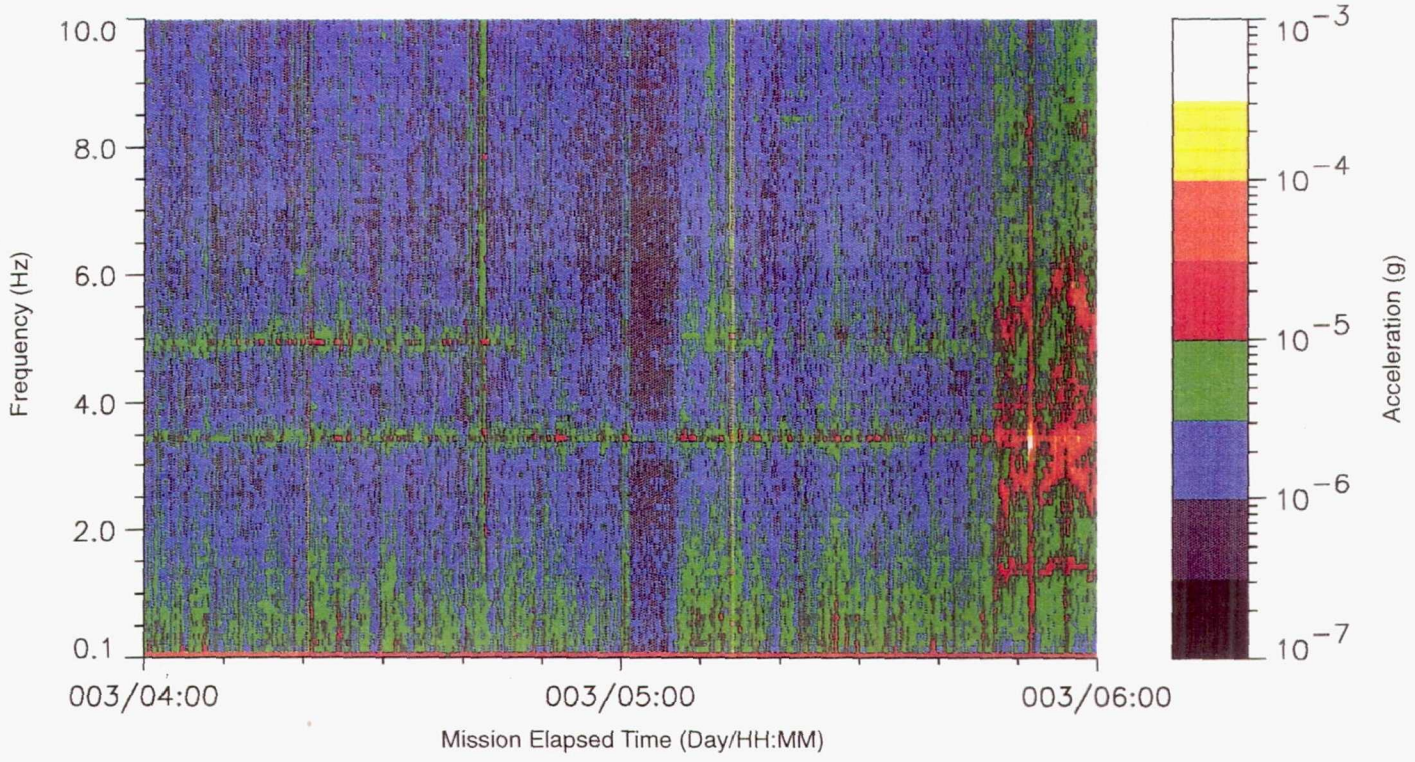

Figure C-32 ATLAS-3 Locker Door MF28E, Vector Magnitude

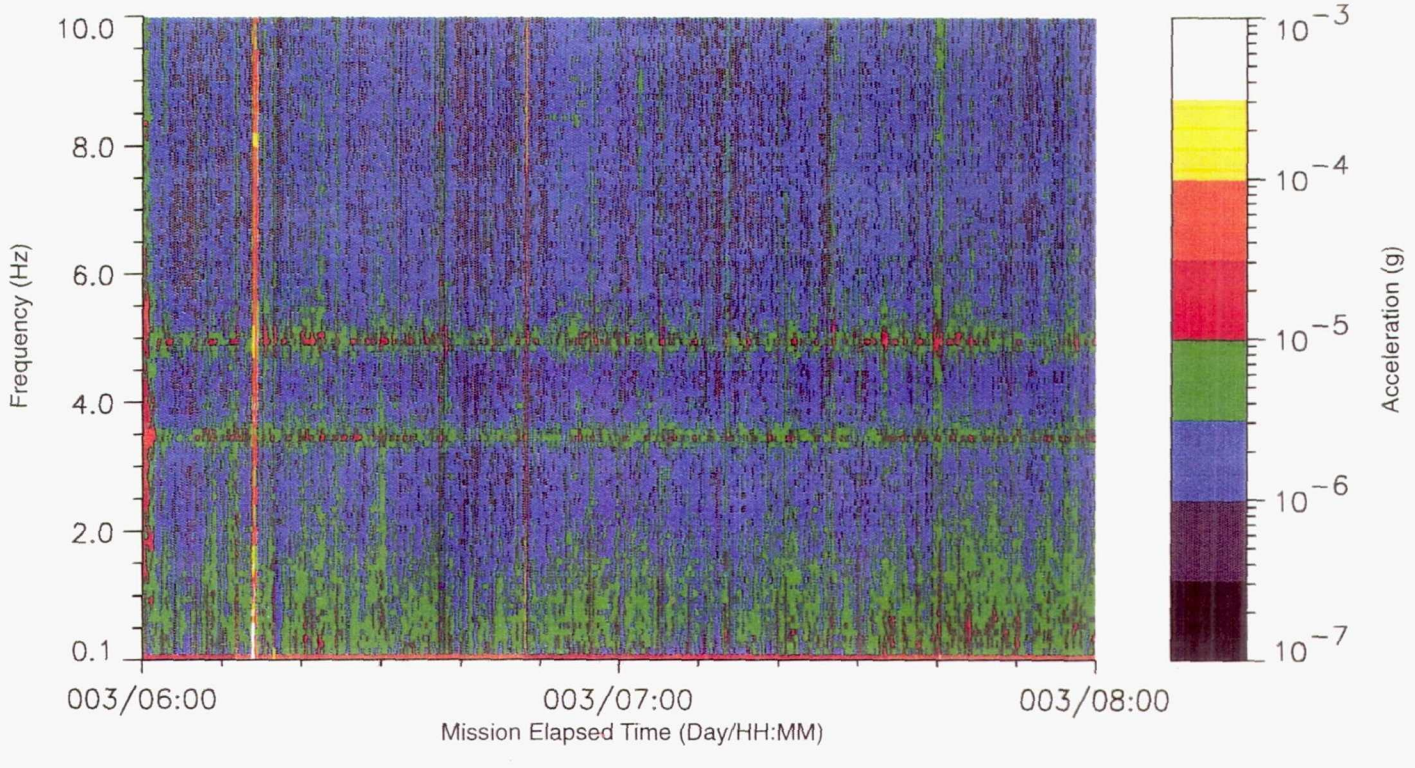

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Figure C-33 ATLAS-3 Locker Door MF28E, Vector Magnitude

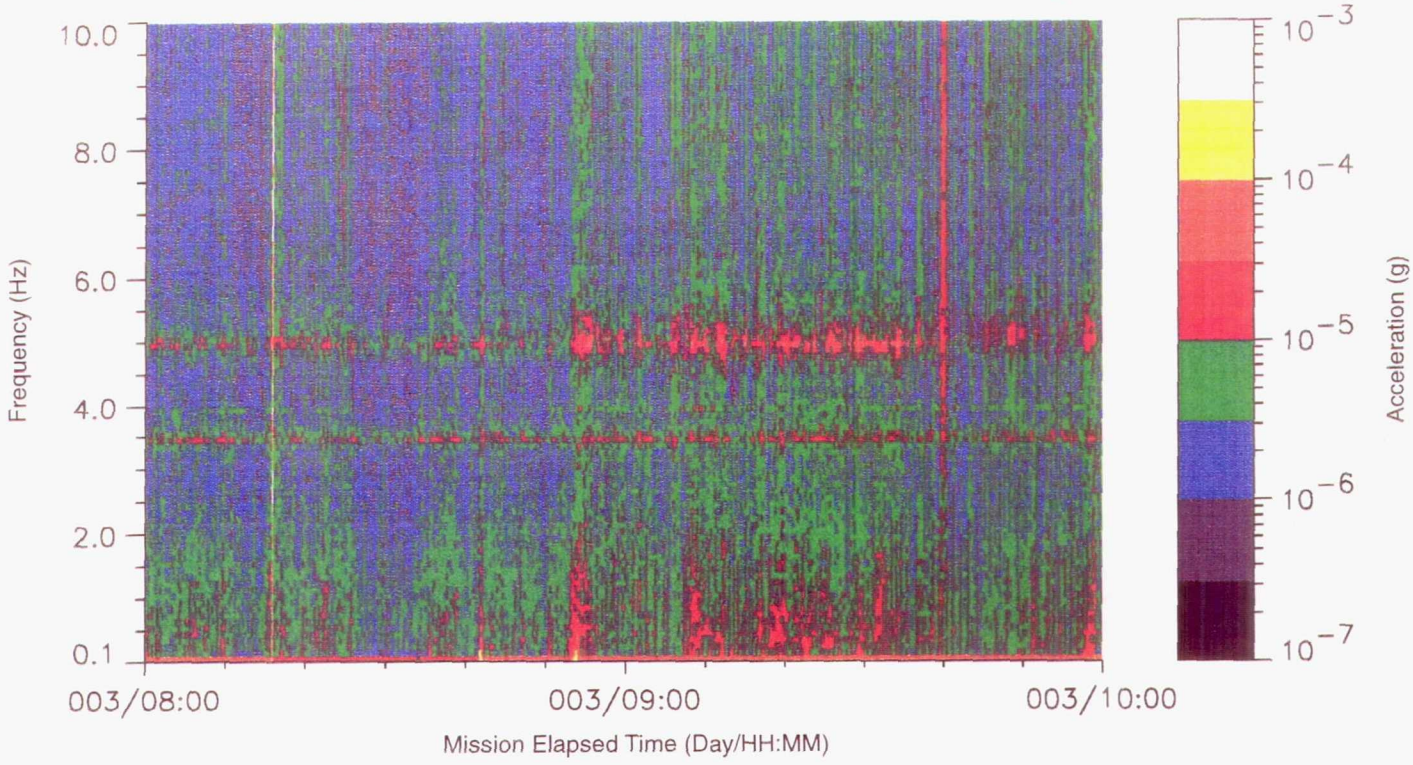

Figure C-34 ATLAS-3 Locker Door MF28E, Vector Magnitude

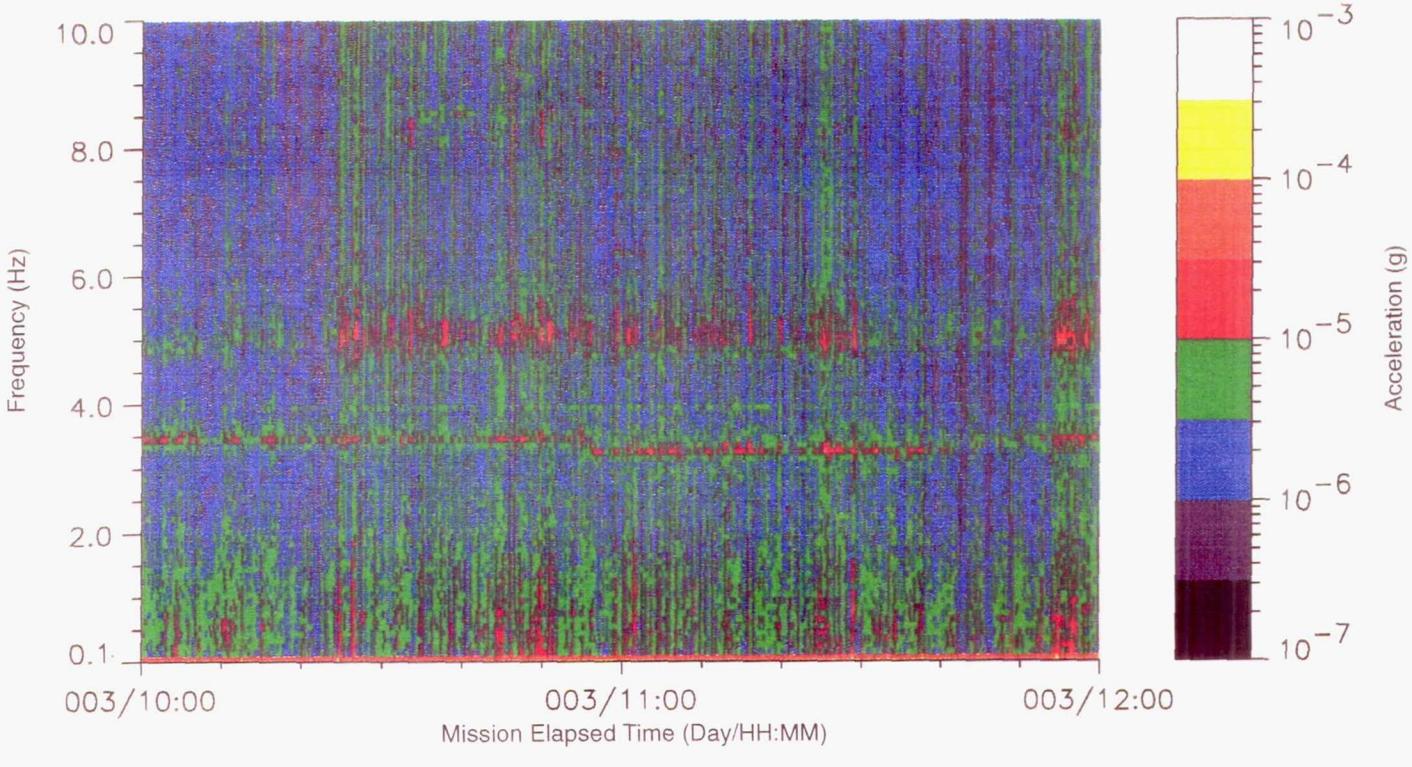

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Figure C-35 ATLAS-3 Locker Door MF28E, Vector Magnitude

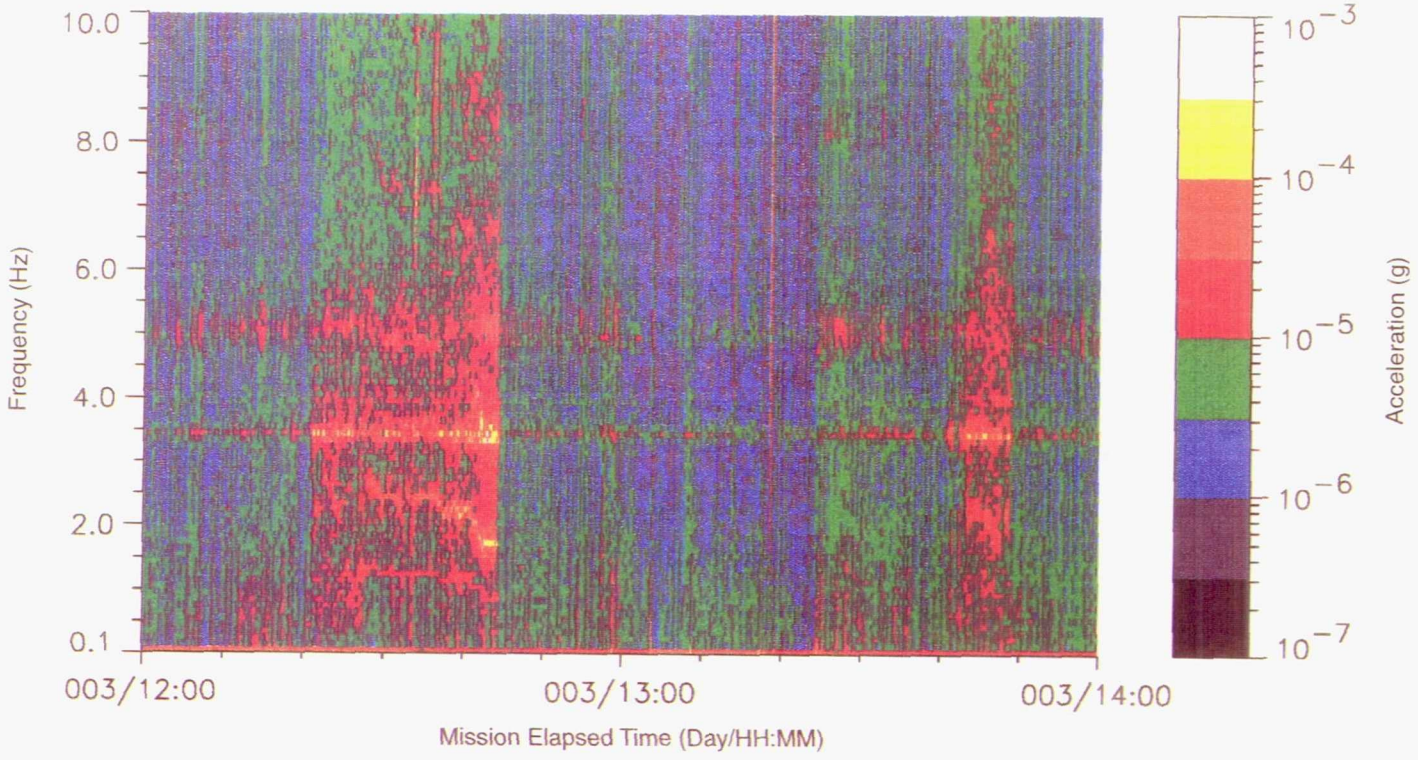

Figure C-36 ATLAS-3 Locker Door MF28E, Vector Magnitude

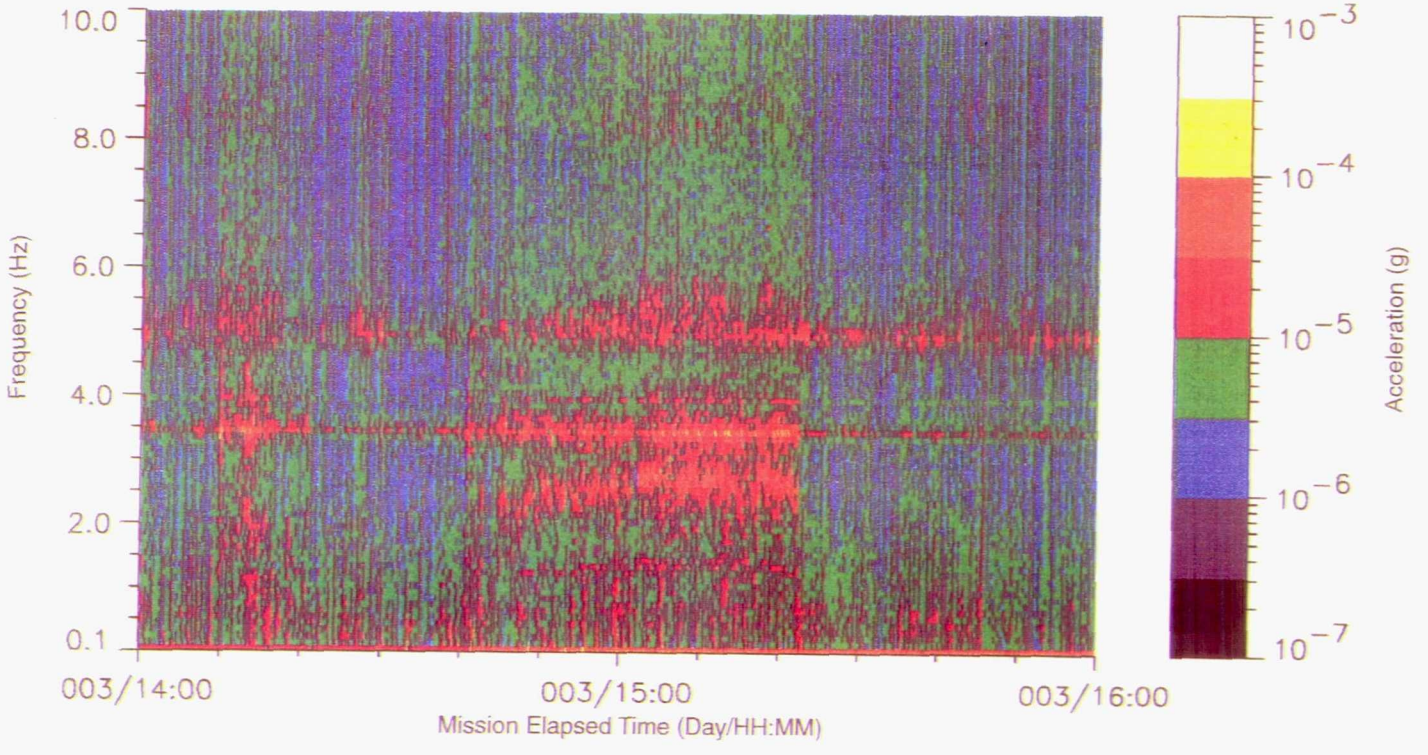

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Figure C-37 ATLAS-3 Locker Door MF28E, Vector Magnitude

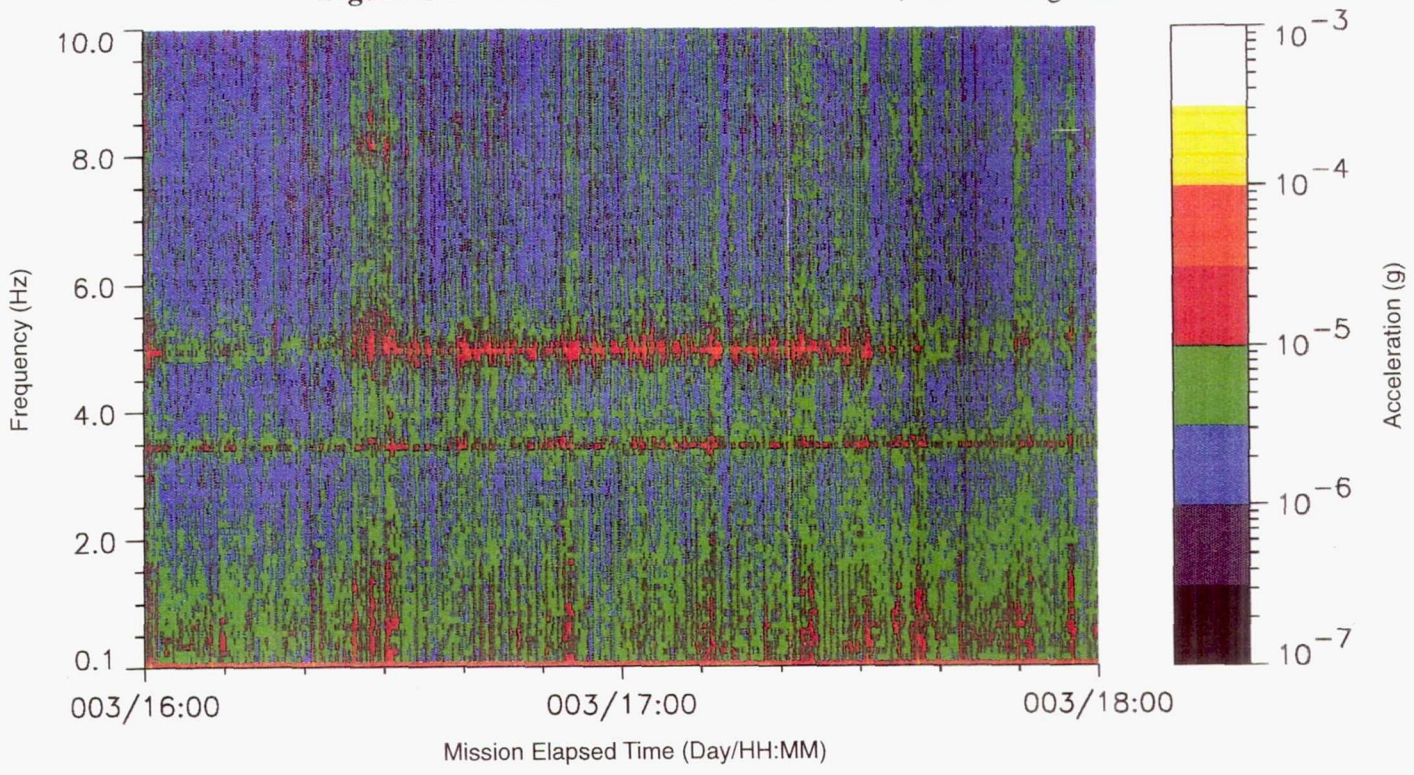

Figure C-38 ATLAS-3 Locker Door MF28E, Vector Magnitude

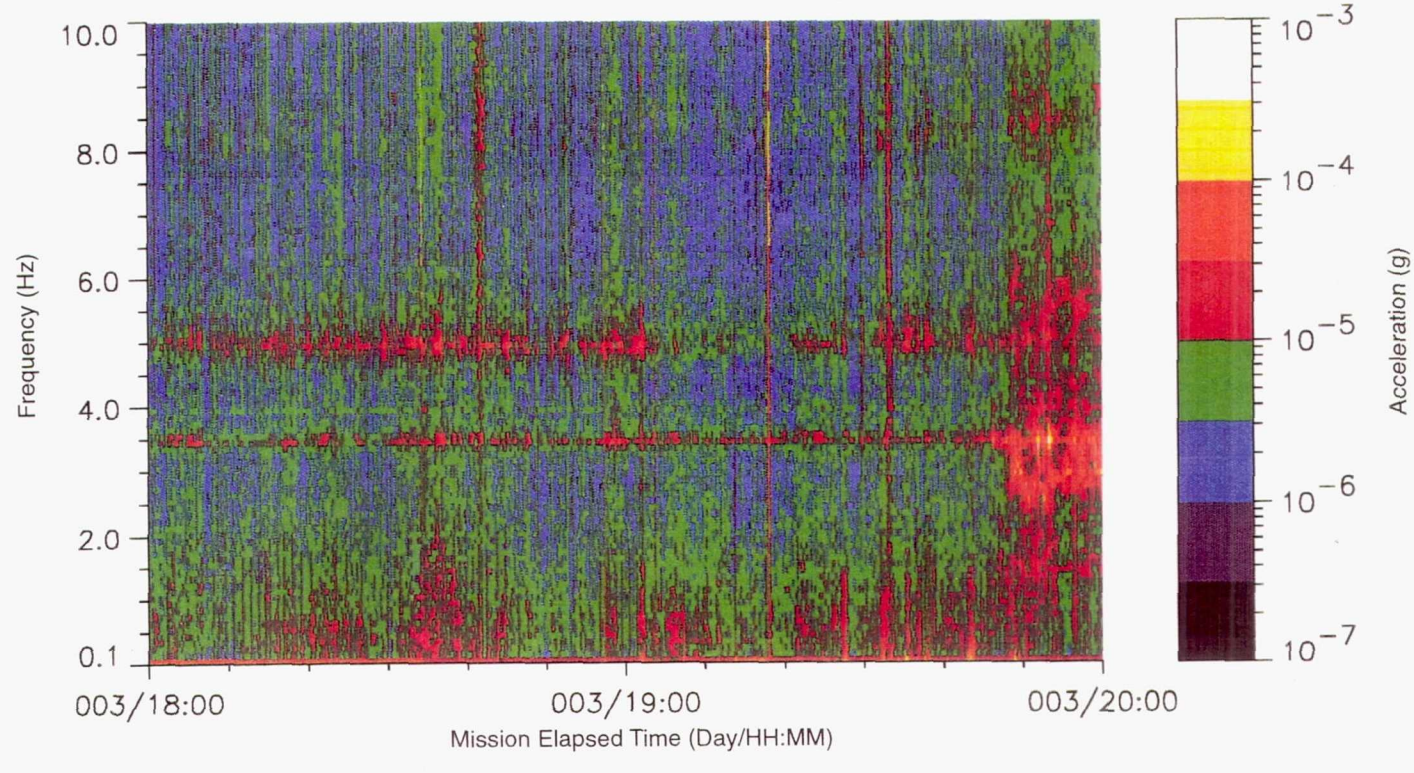

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Figure C-39 ATLAS-3 Locker Door MF28E, Vector Magnitude

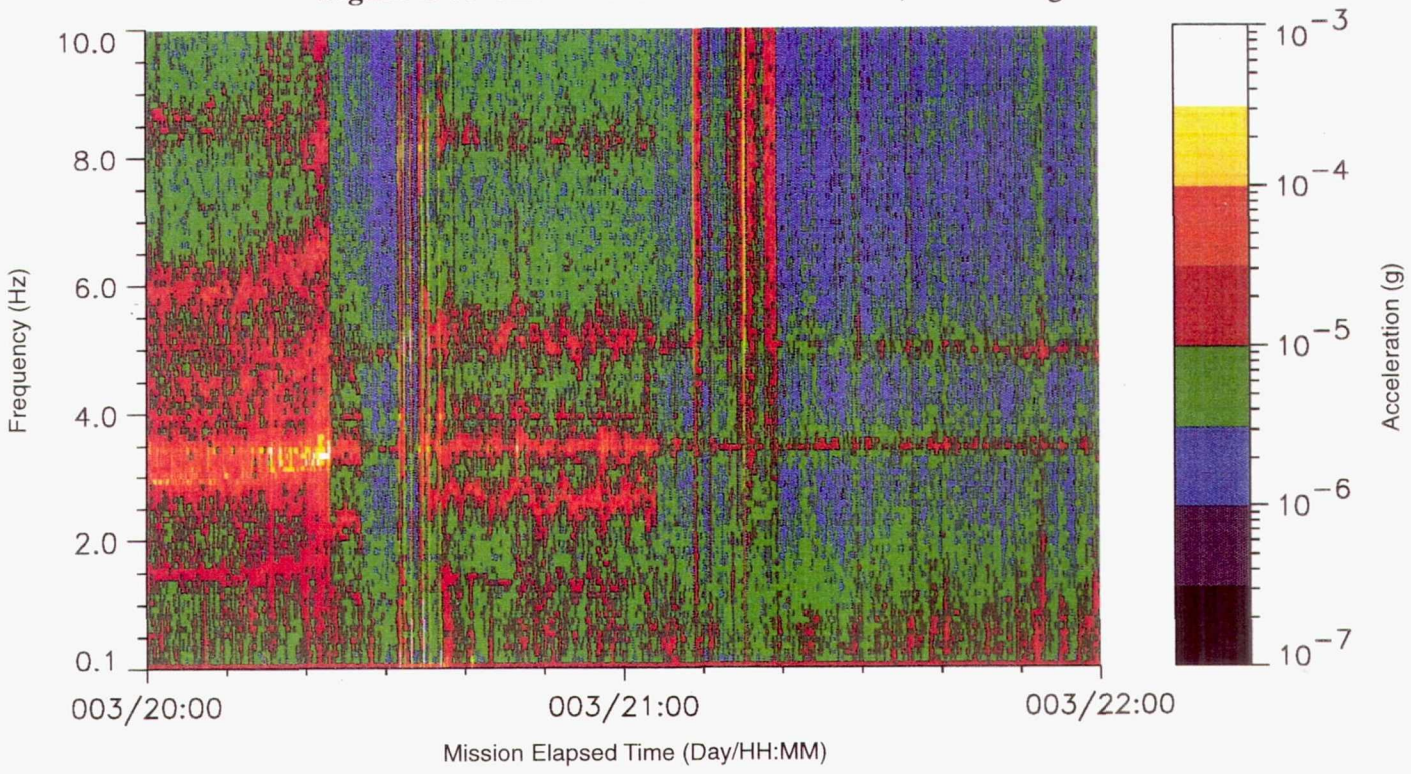

Figure C-40 ATLAS-3 Locker Door MF28E, Vector Magnitude

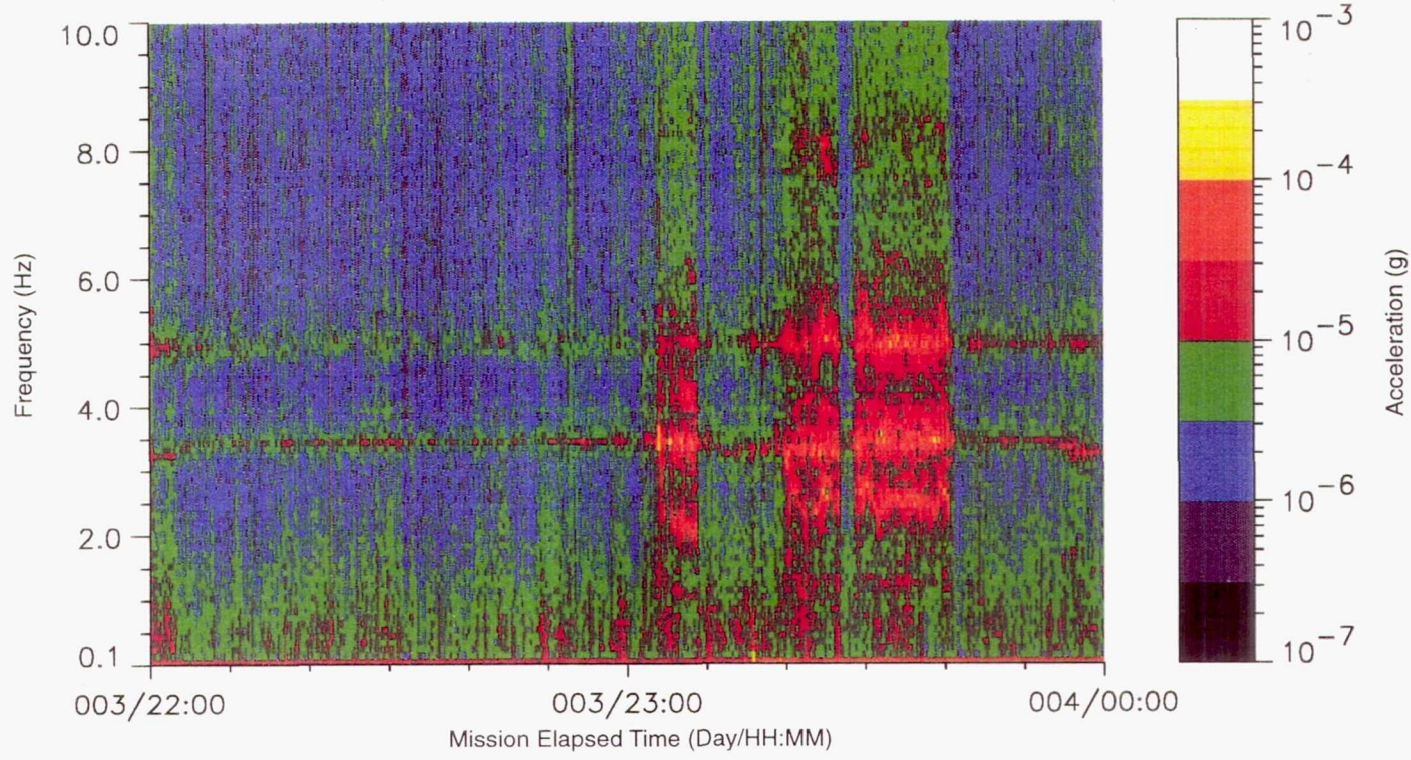

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Figure C-41 ATLAS-3 Locker Door MF28E, Vector Magnitude

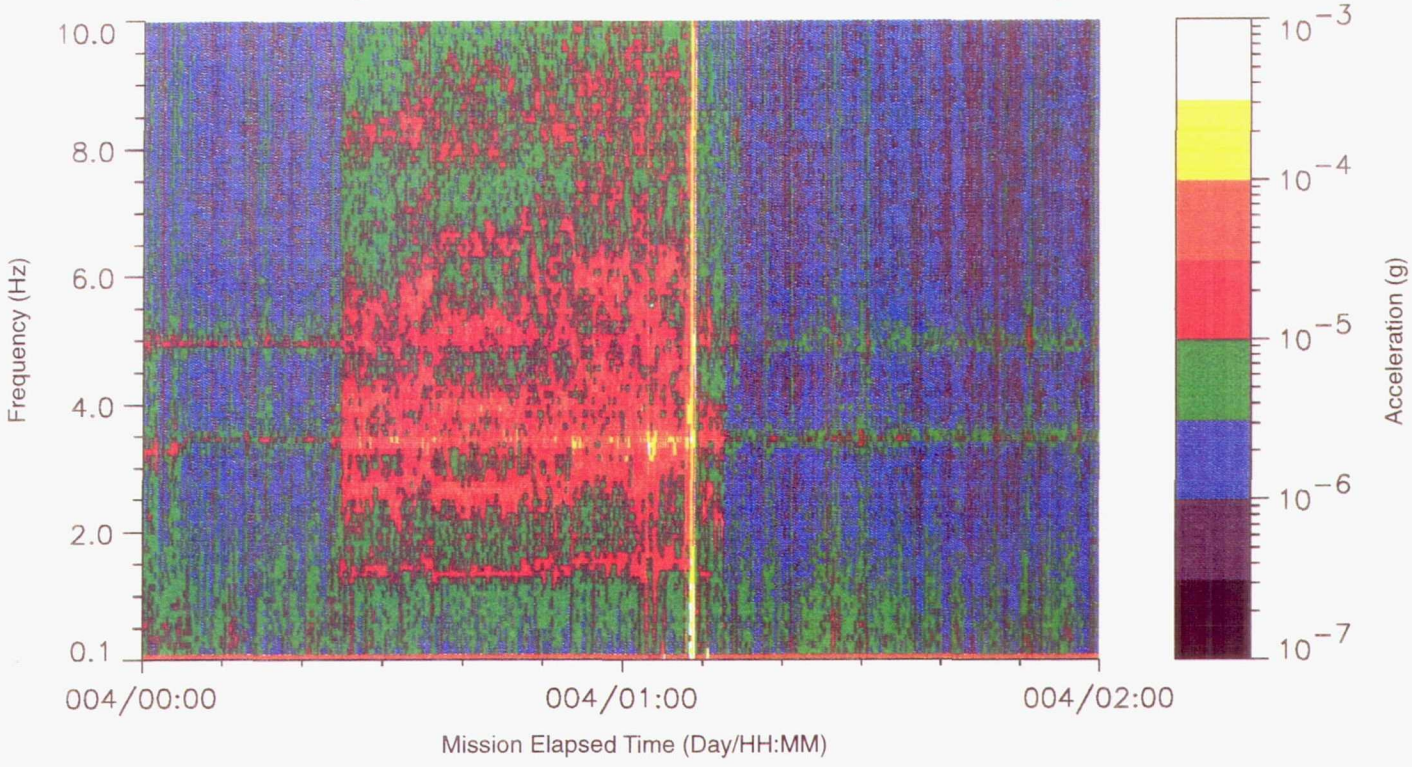

Figure C-42 ATLAS-3 Locker Door MF28E, Vector Magnitude

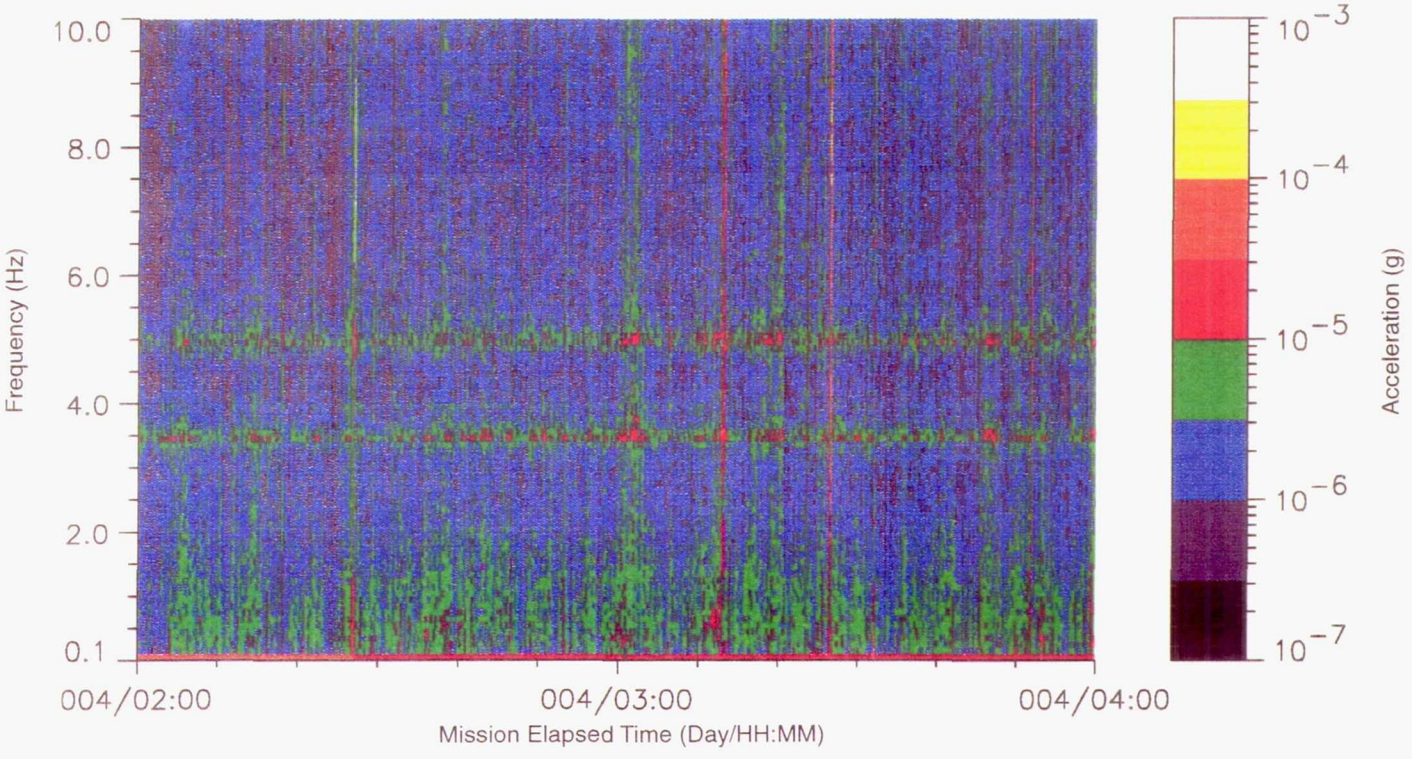

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Figure C-43 ATLAS-3 Locker Door MF28E, Vector Magnitude

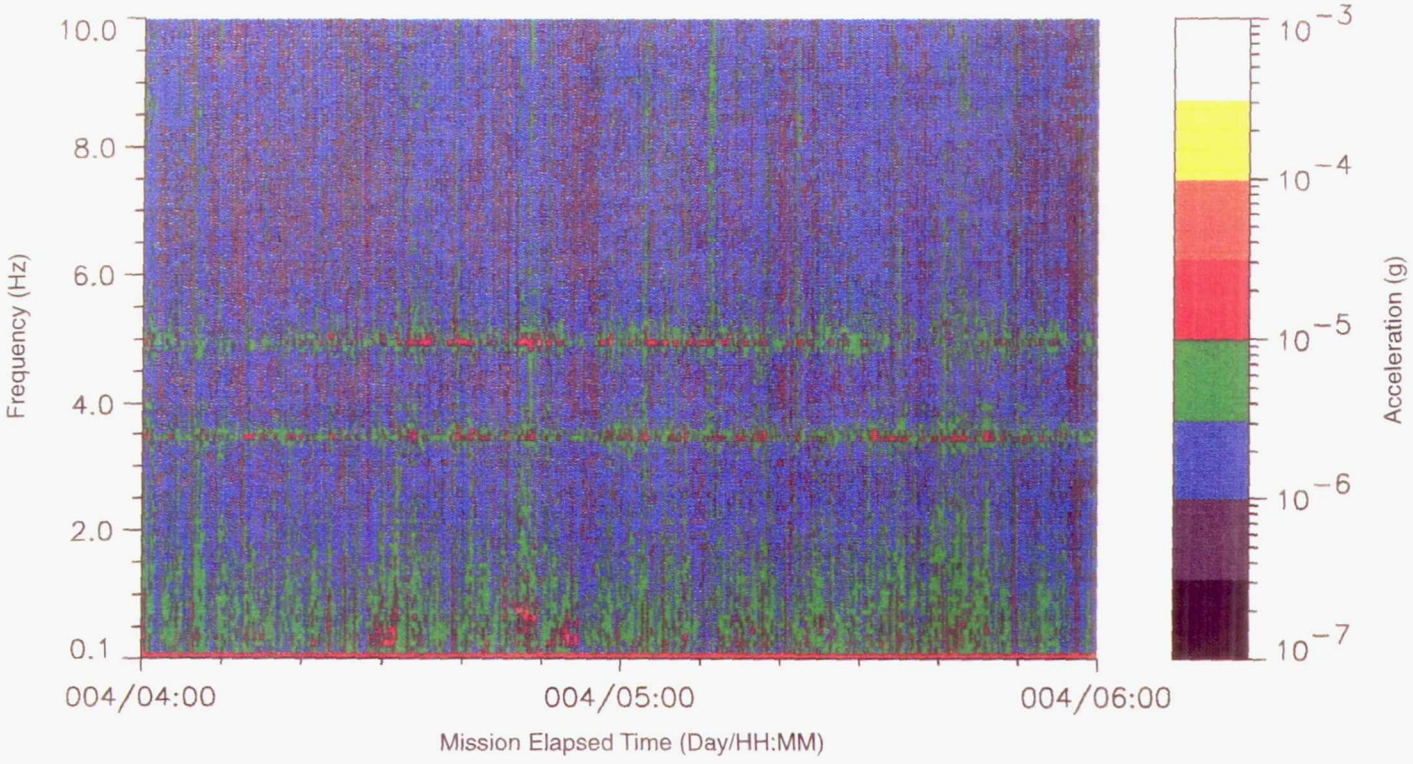

Figure C-44 ATLAS-3 Locker Door MF28E, Vector Magnitude

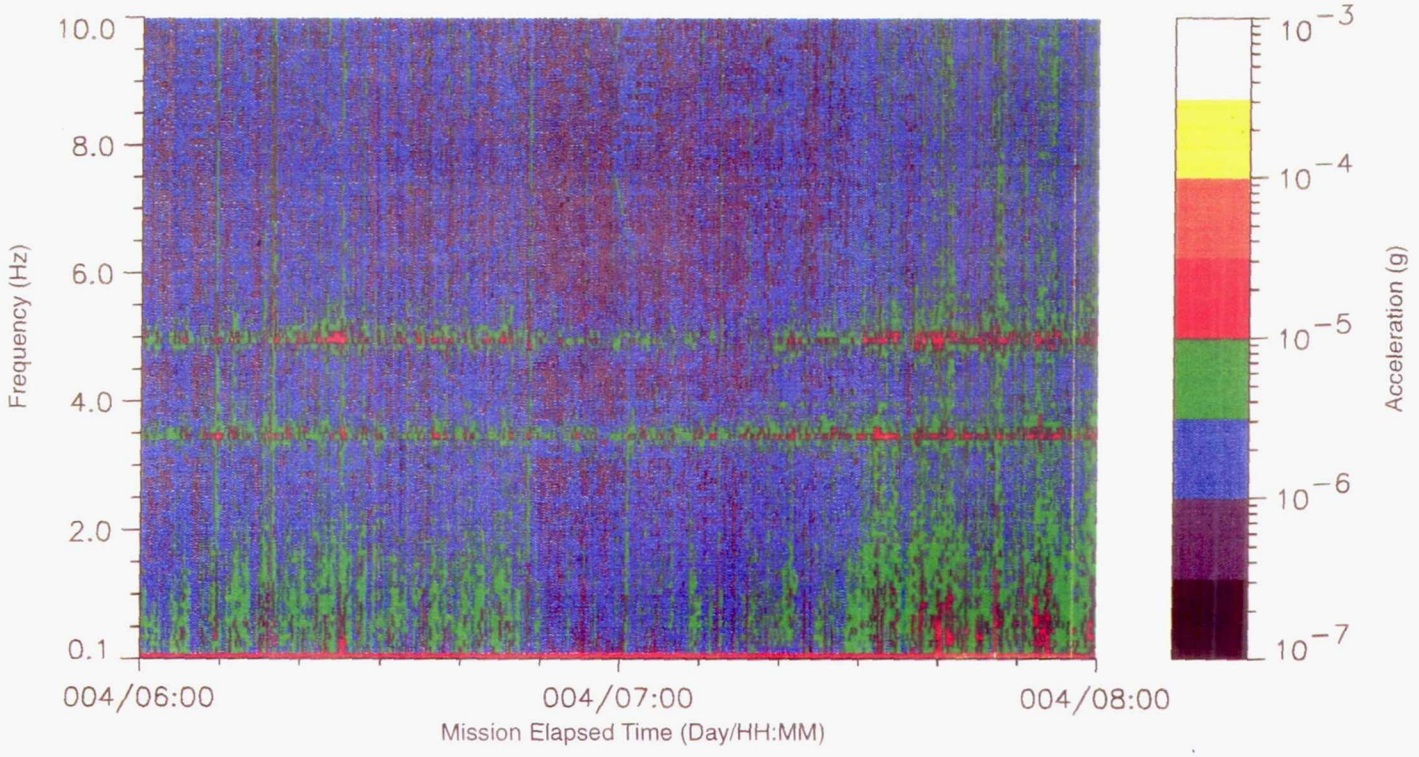

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Figure C-45 ATLAS-3 Locker Door MF28E, Vector Magnitude

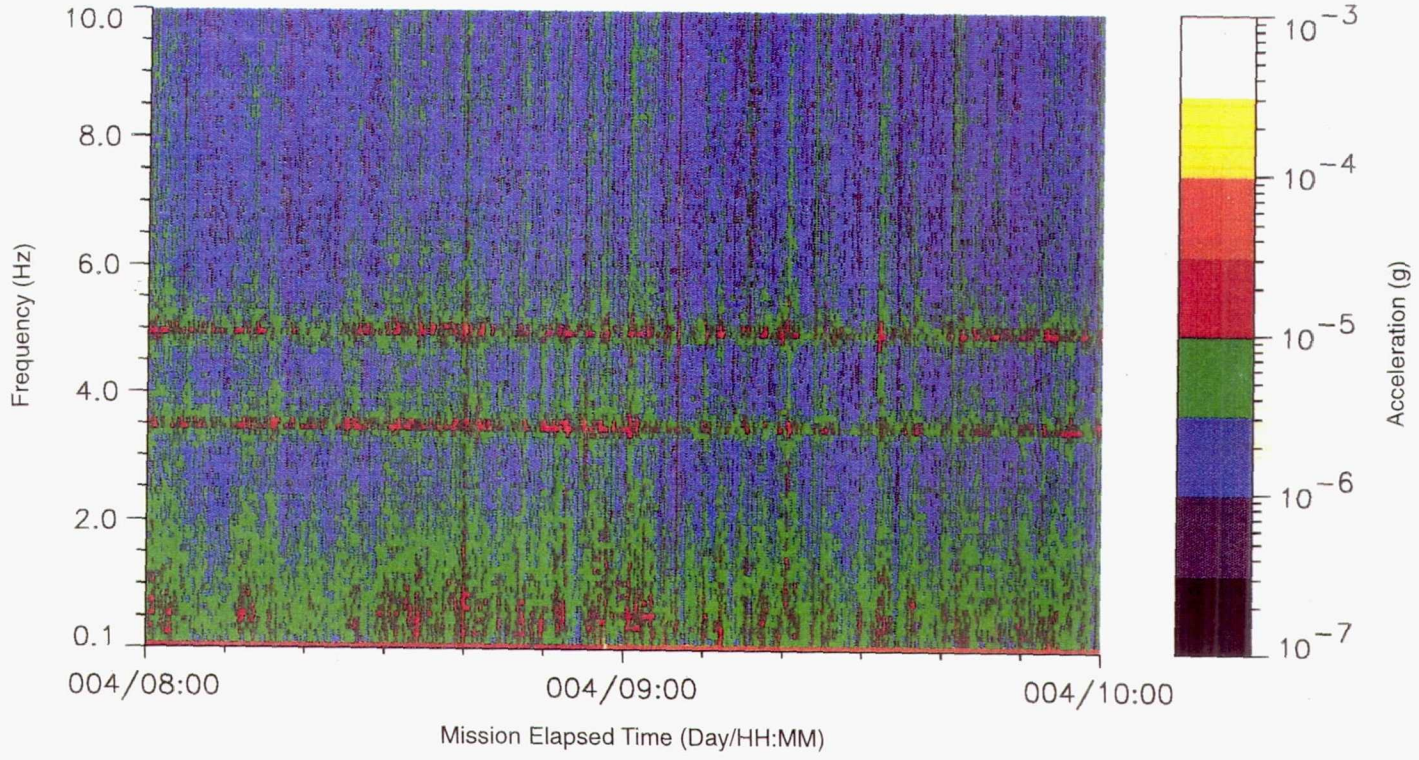

Figure C-46 ATLAS-3 Locker Door MF28E, Vector Magnitude

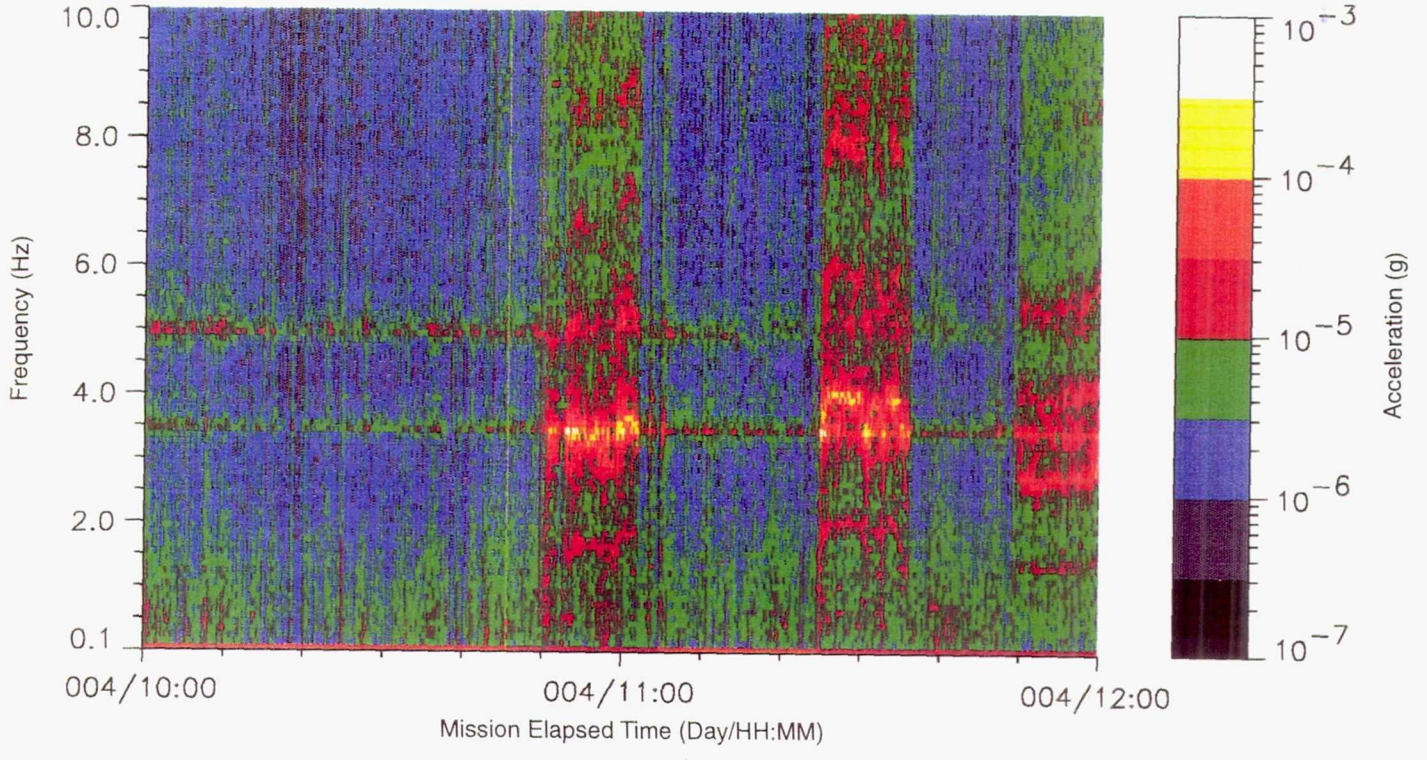

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Figure C-47 ATLAS-3 Locker Door MF28E, Vector Magnitude

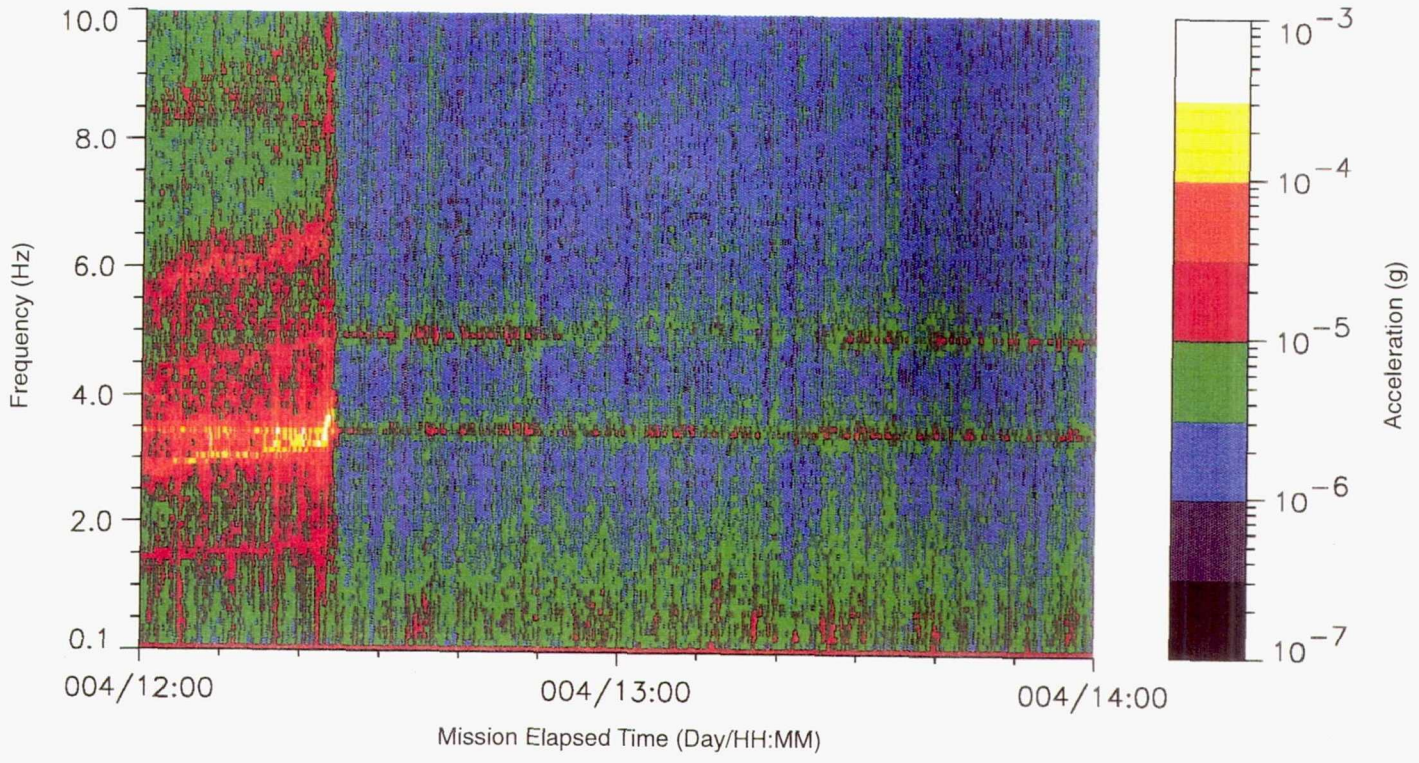

Figure C-48 ATLAS-3 Locker Door MF28E, Vector Magnitude

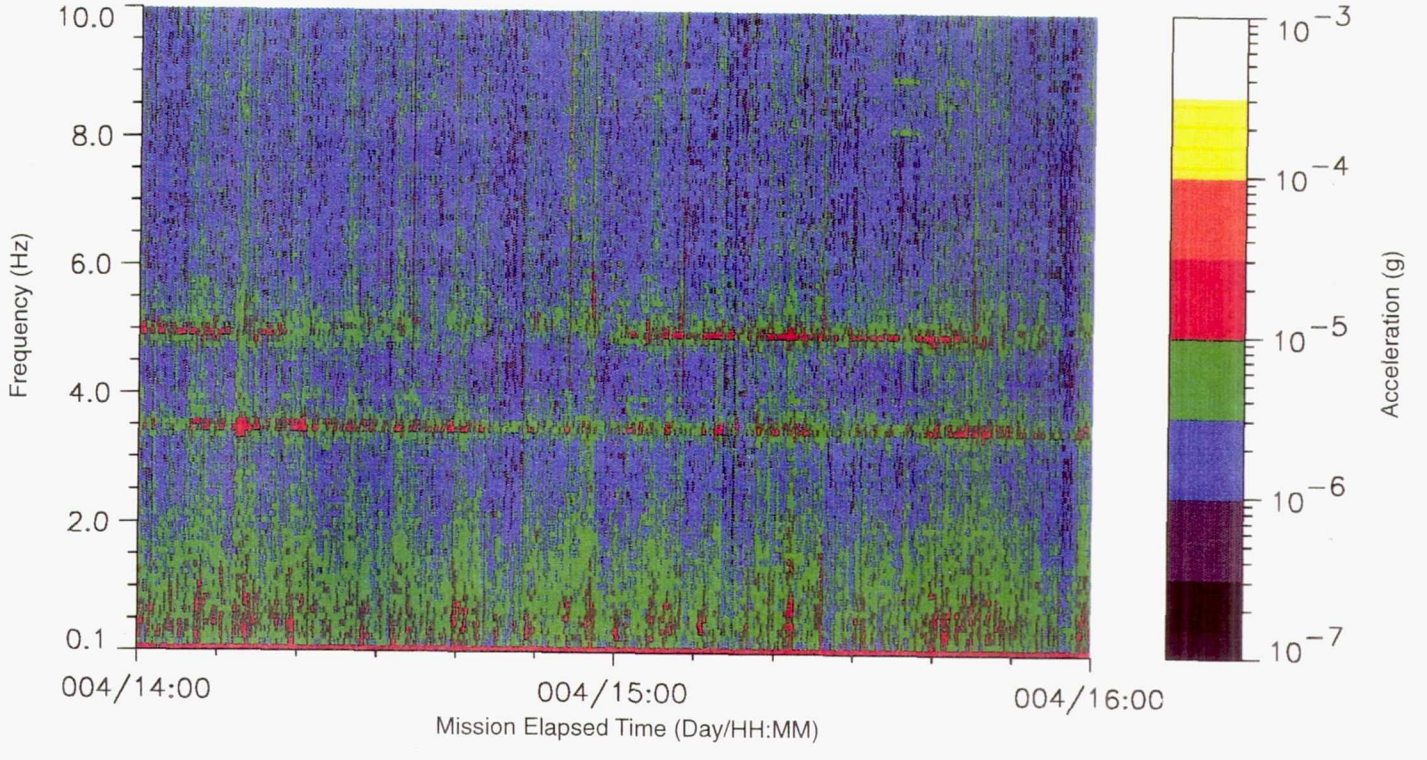

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Figure C-49 ATLAS-3 Locker Door MF28E, Vector Magnitude

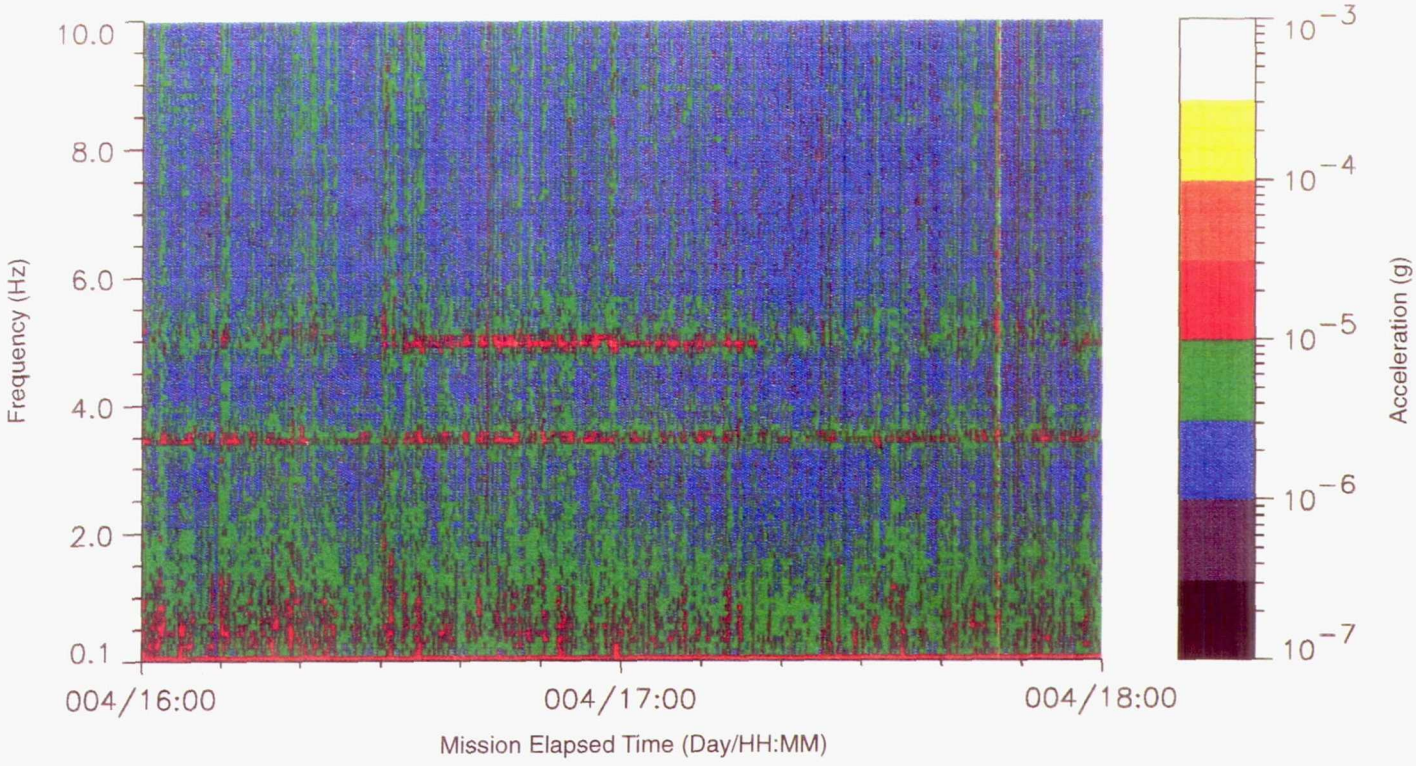

Figure C-50 ATLAS-3 Locker Door MF28E, Vector Magnitude

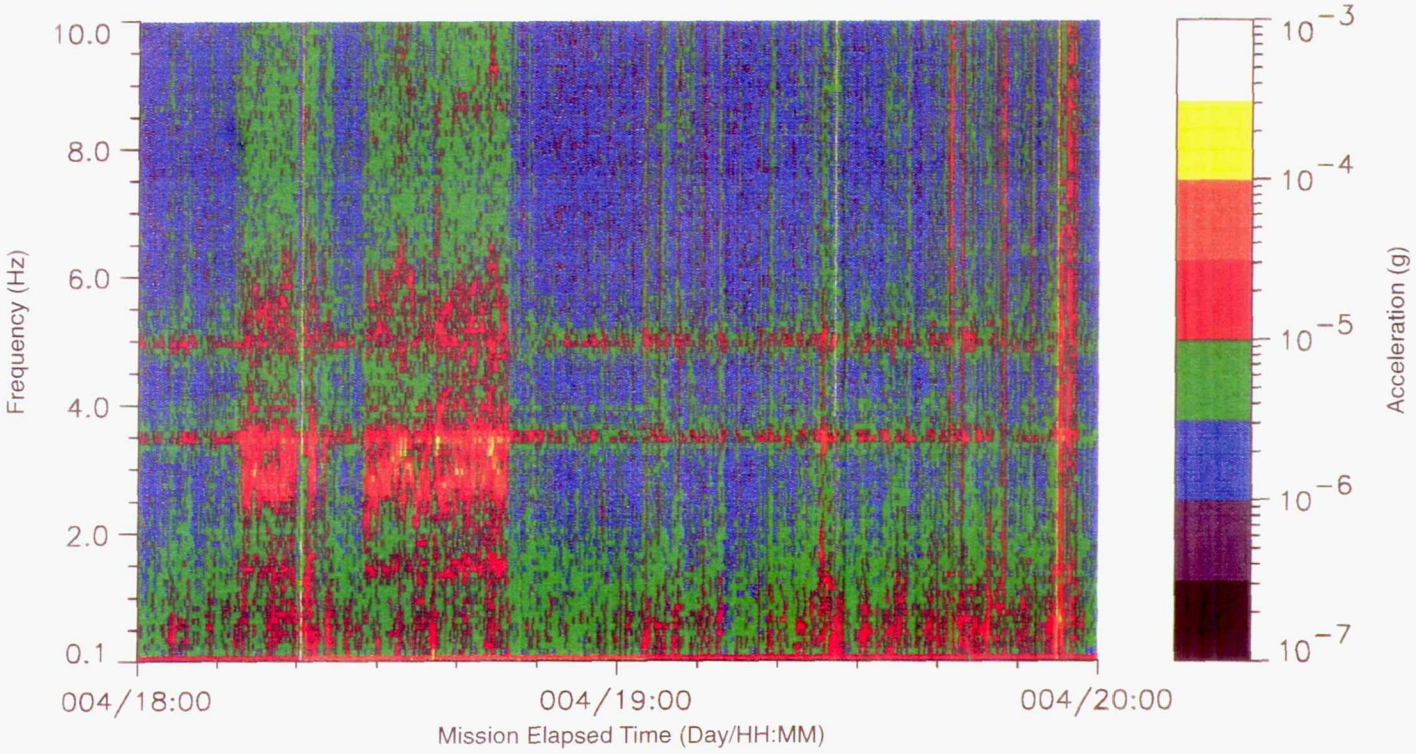

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Figure C-51 ATLAS-3 Locker Door MF28E, Vector Magnitude

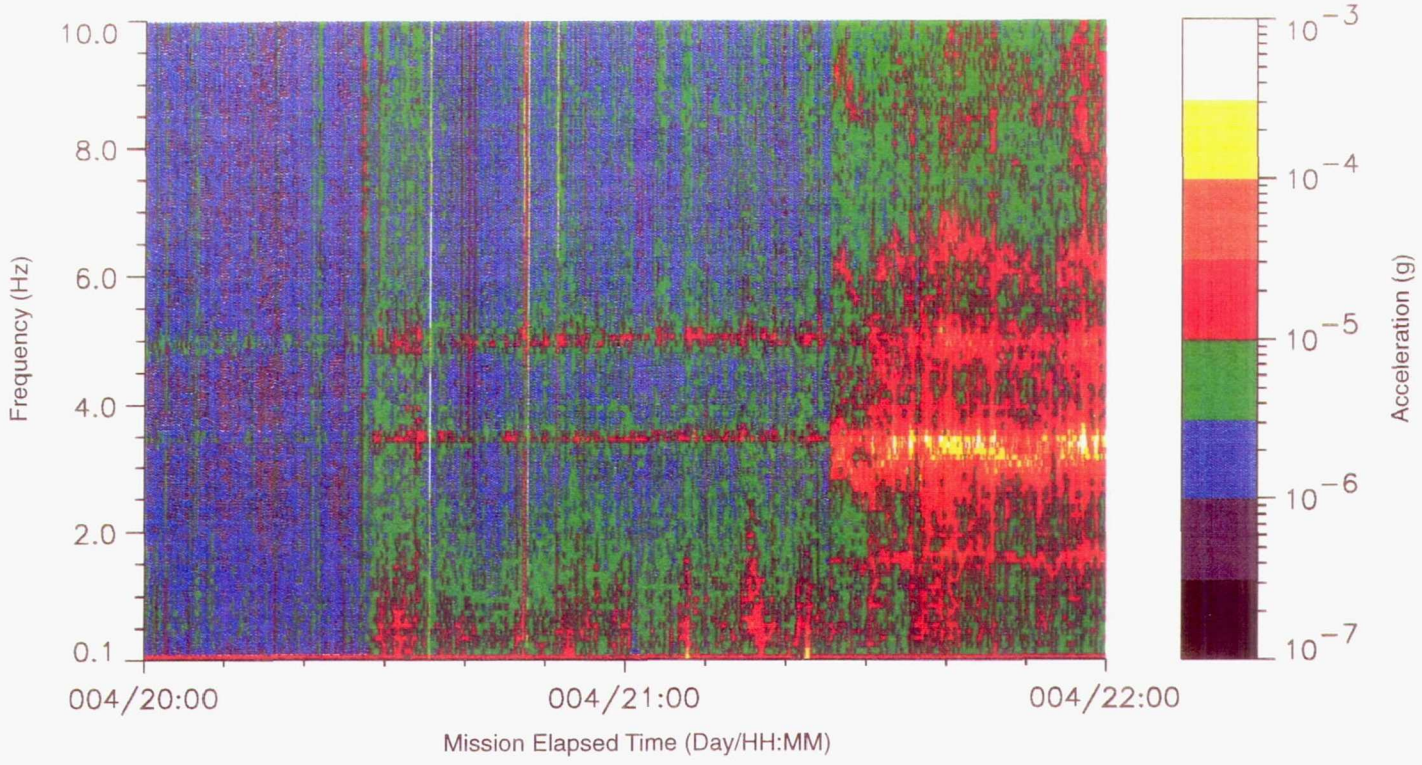

Figure C-52 ATLAS-3 Locker Door MF28E, Vector Magnitude

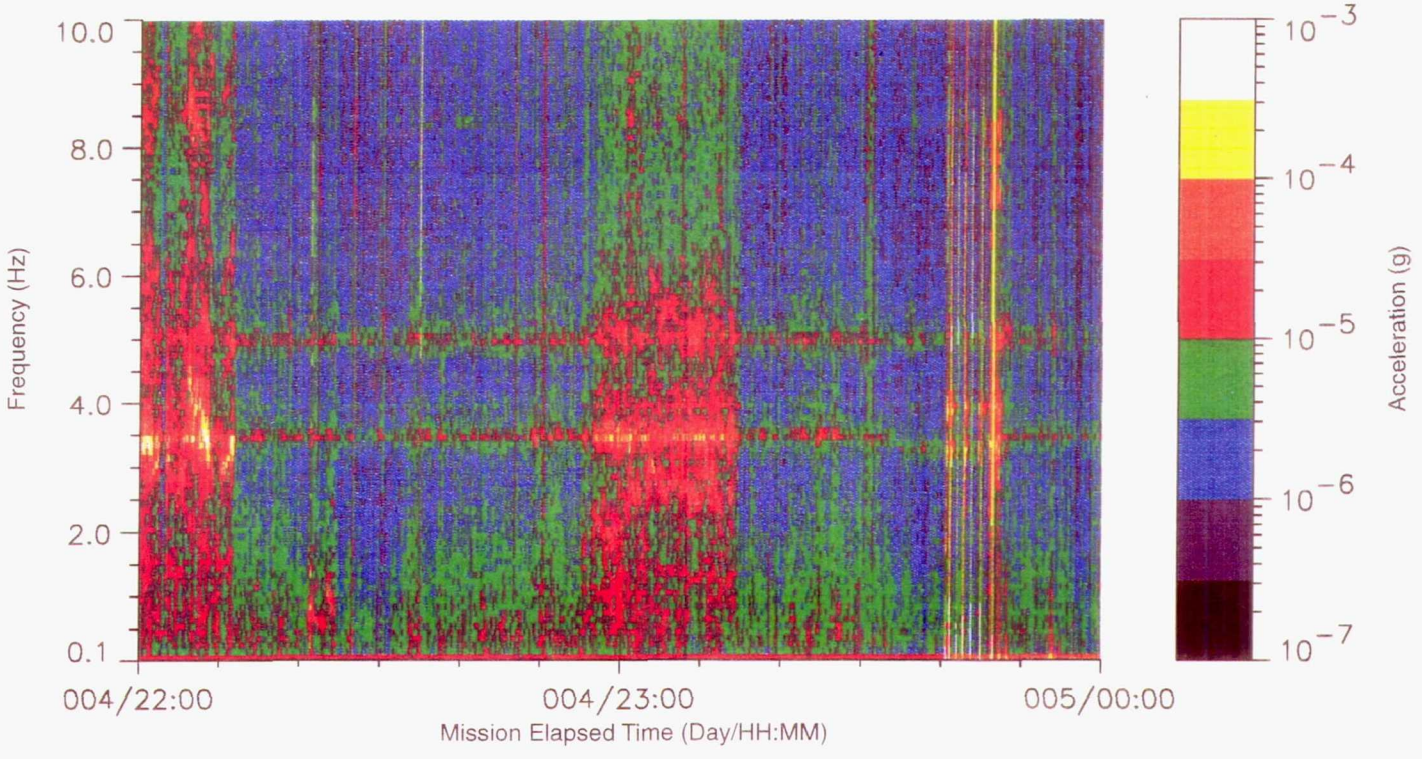

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Figure C-53 ATLAS-3 Locker Door MF28E, Vector Magnitude

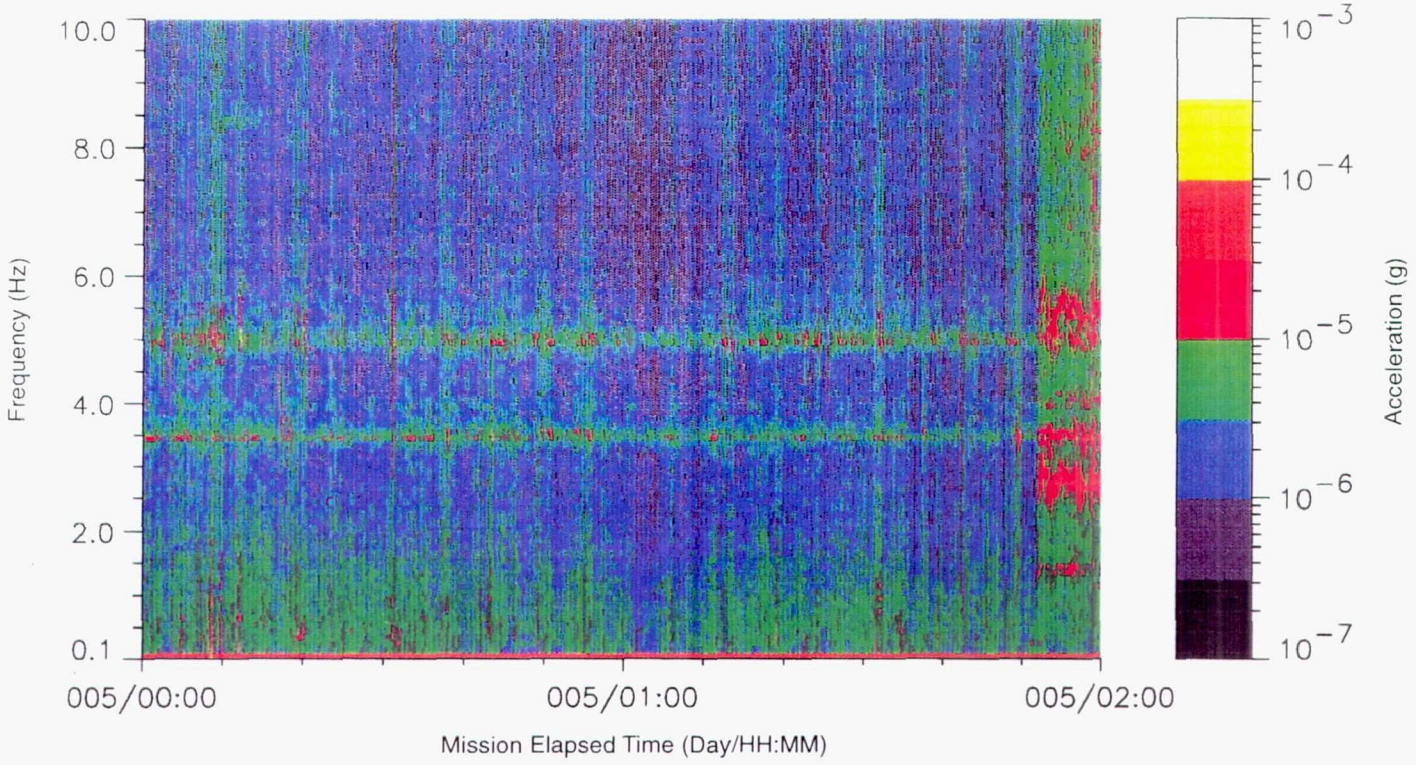

Figure C-54 ATLAS-3 Locker Door MF28E, Vector Magnitude

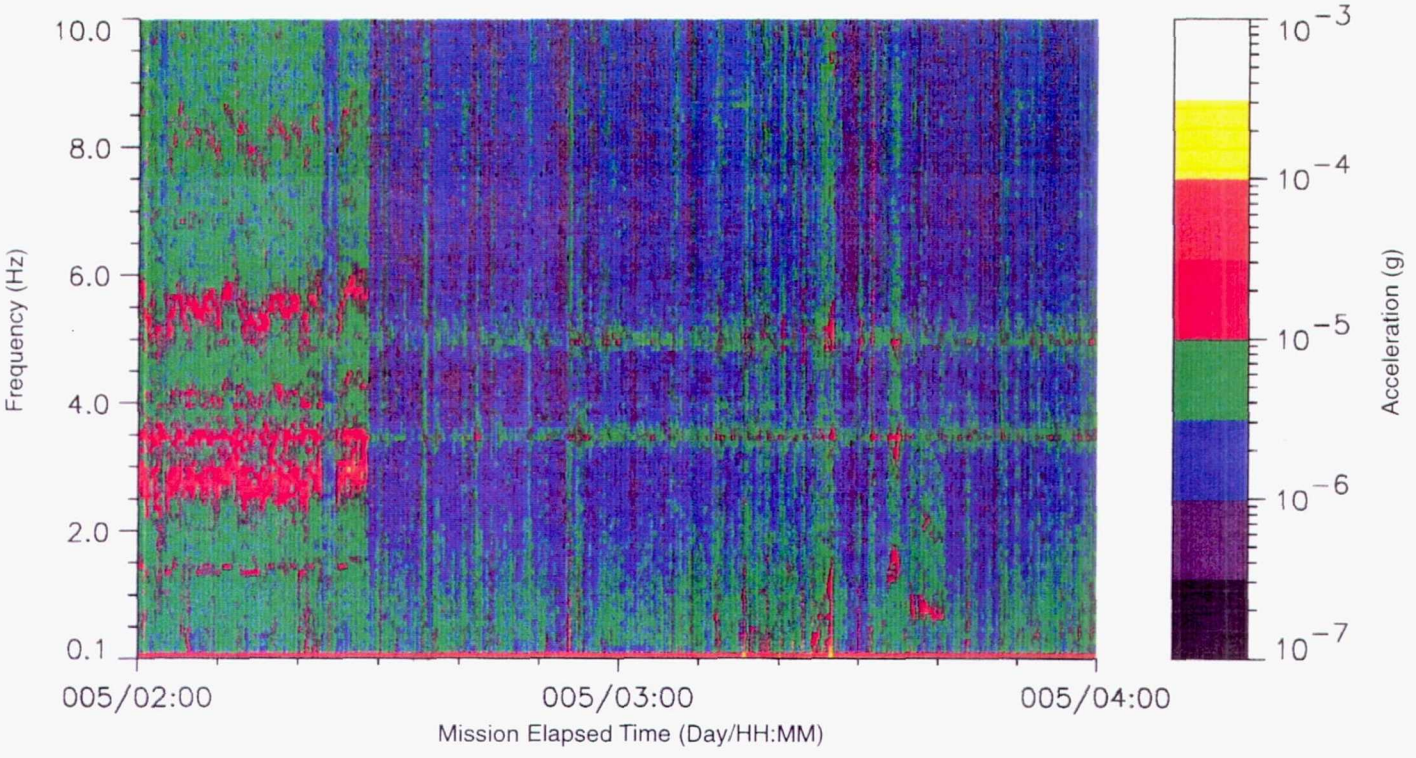

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Figure C-55 ATLAS-3 Locker Door MF28E, Vector Magnitude

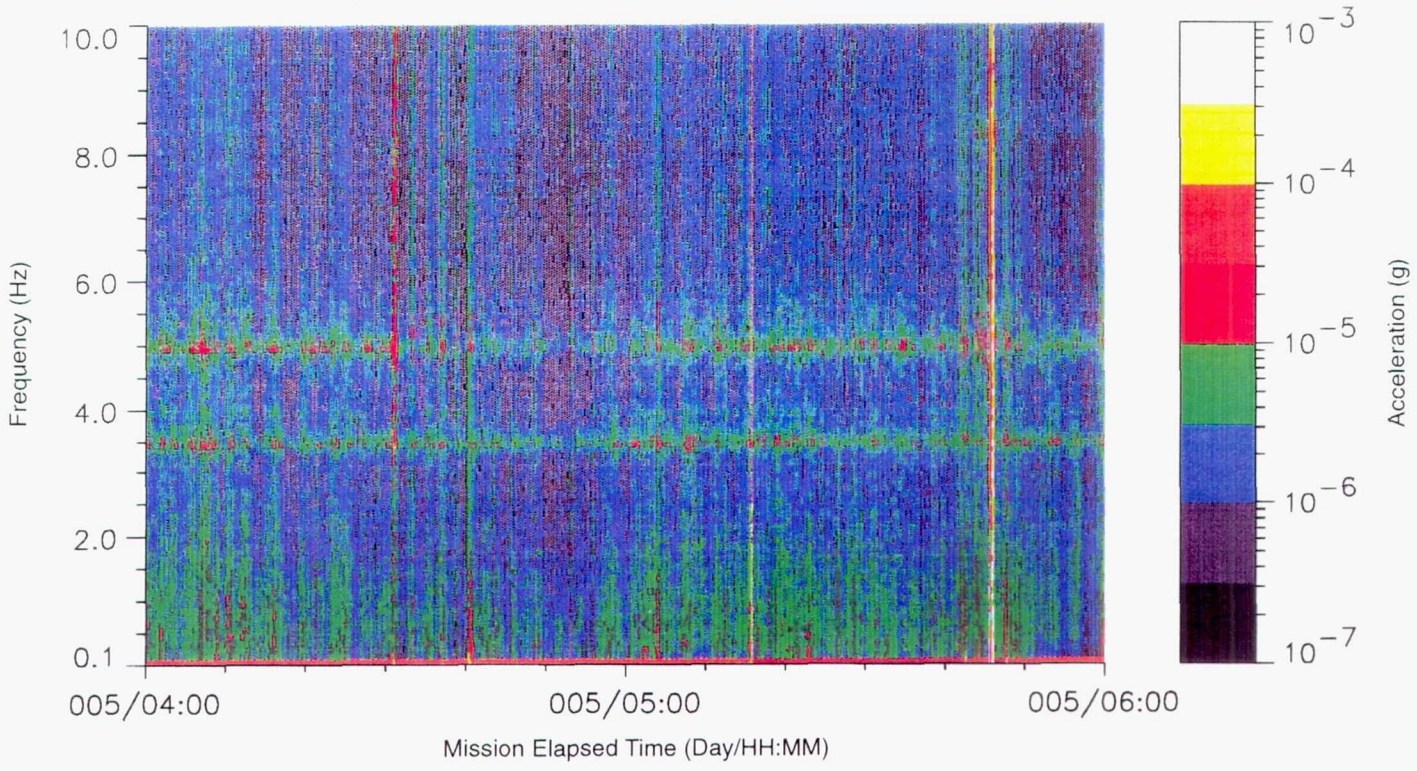

Figure C-56 ATLAS-3 Locker Door MF28E, Vector Magnitude

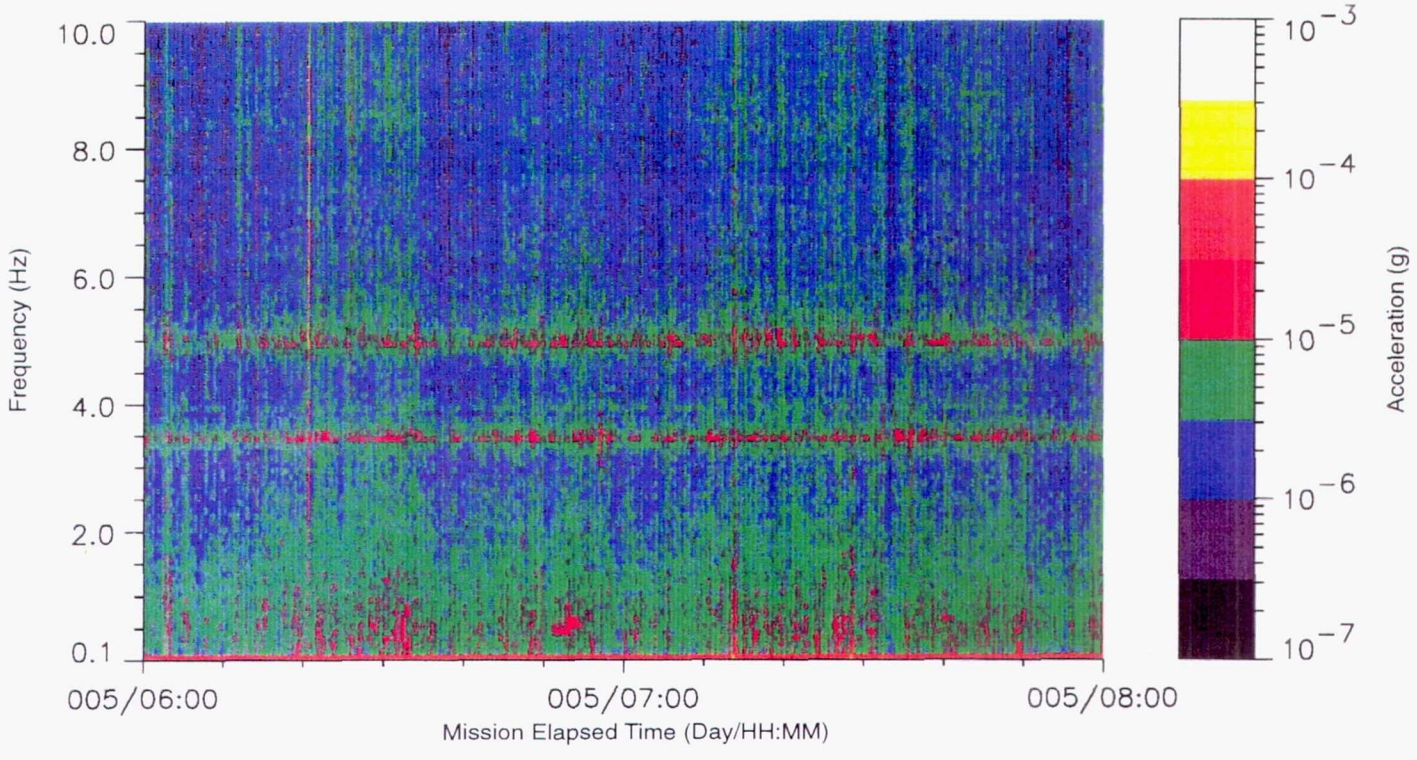

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Figure C-57 ATLAS-3 Locker Door MF28E, Vector Magnitude

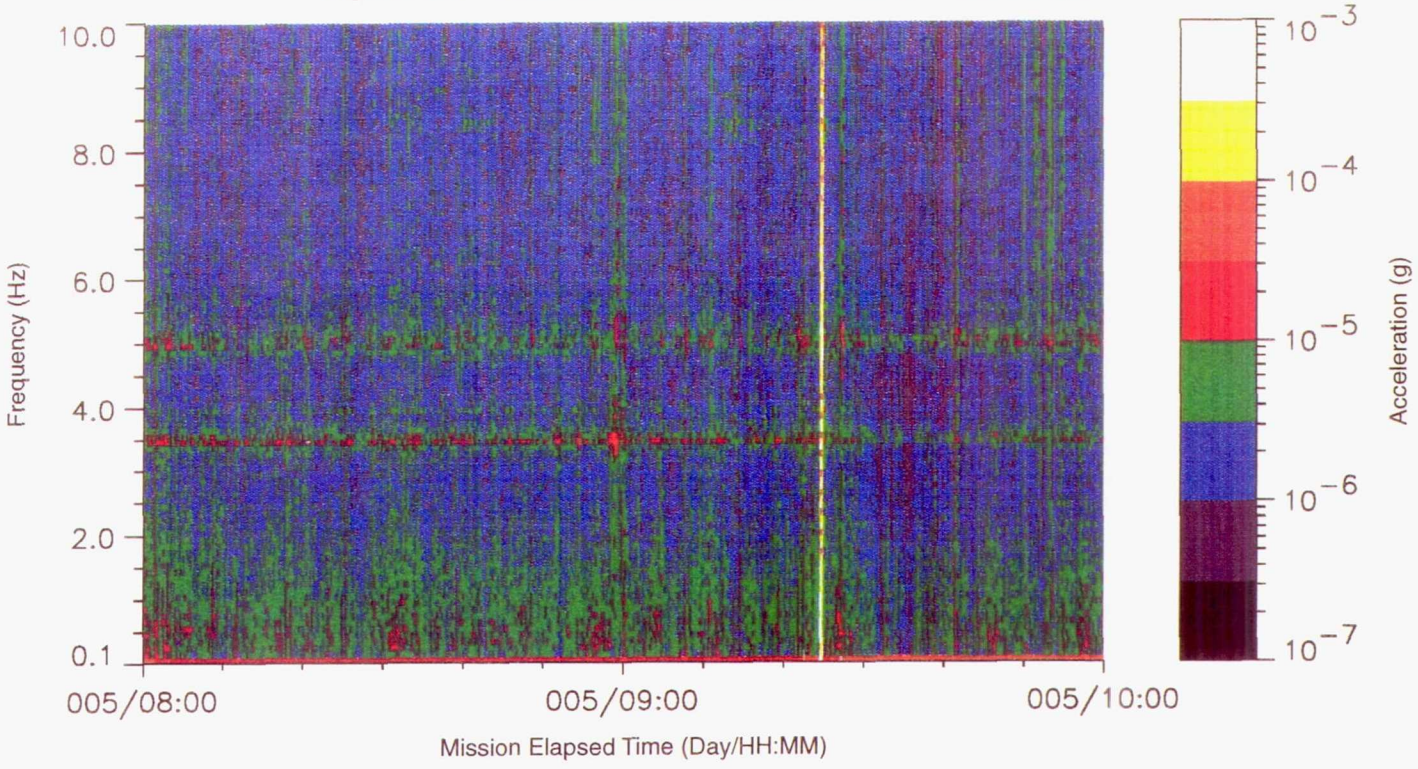

Figure C-58 ATLAS-3 Locker Door MF28E, Vector Magnitude

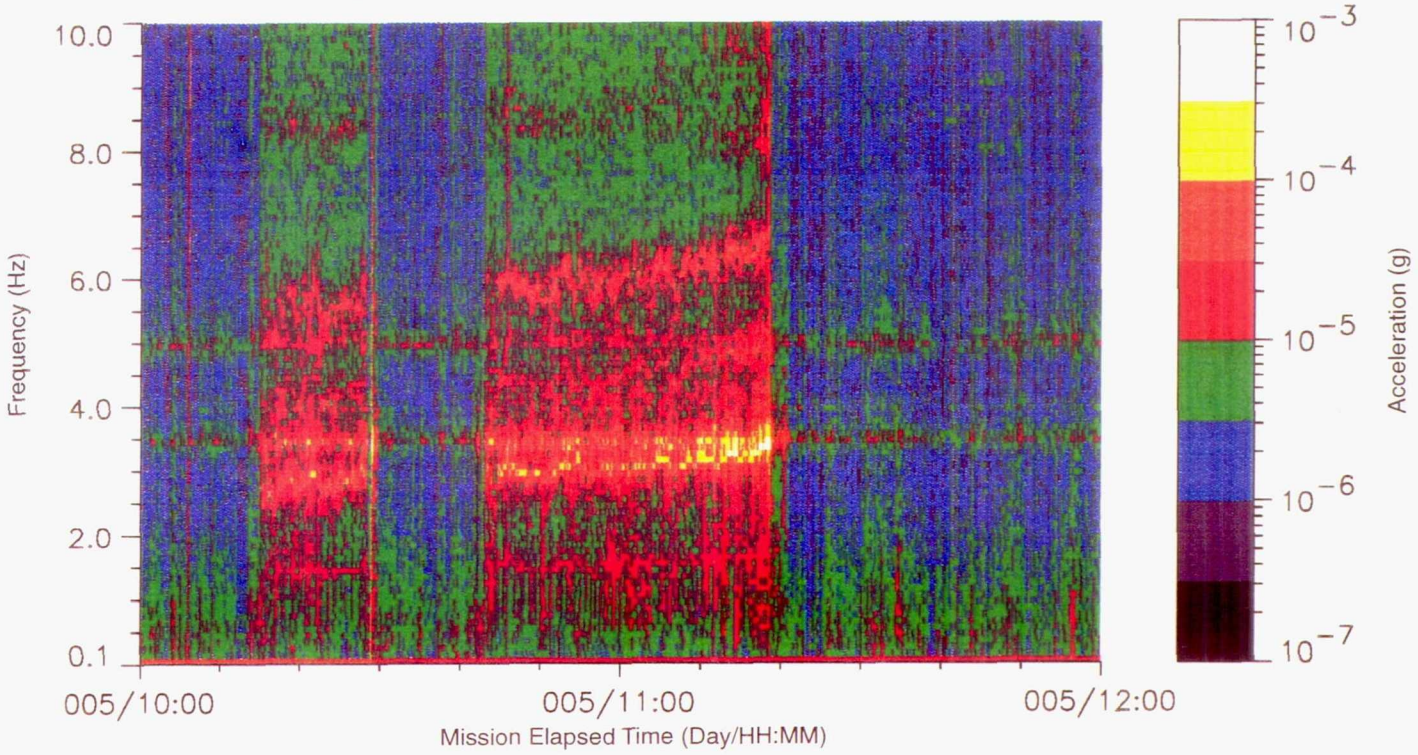

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Figure C-59 ATLAS-3 Locker Door MF28E, Vector Magnitude

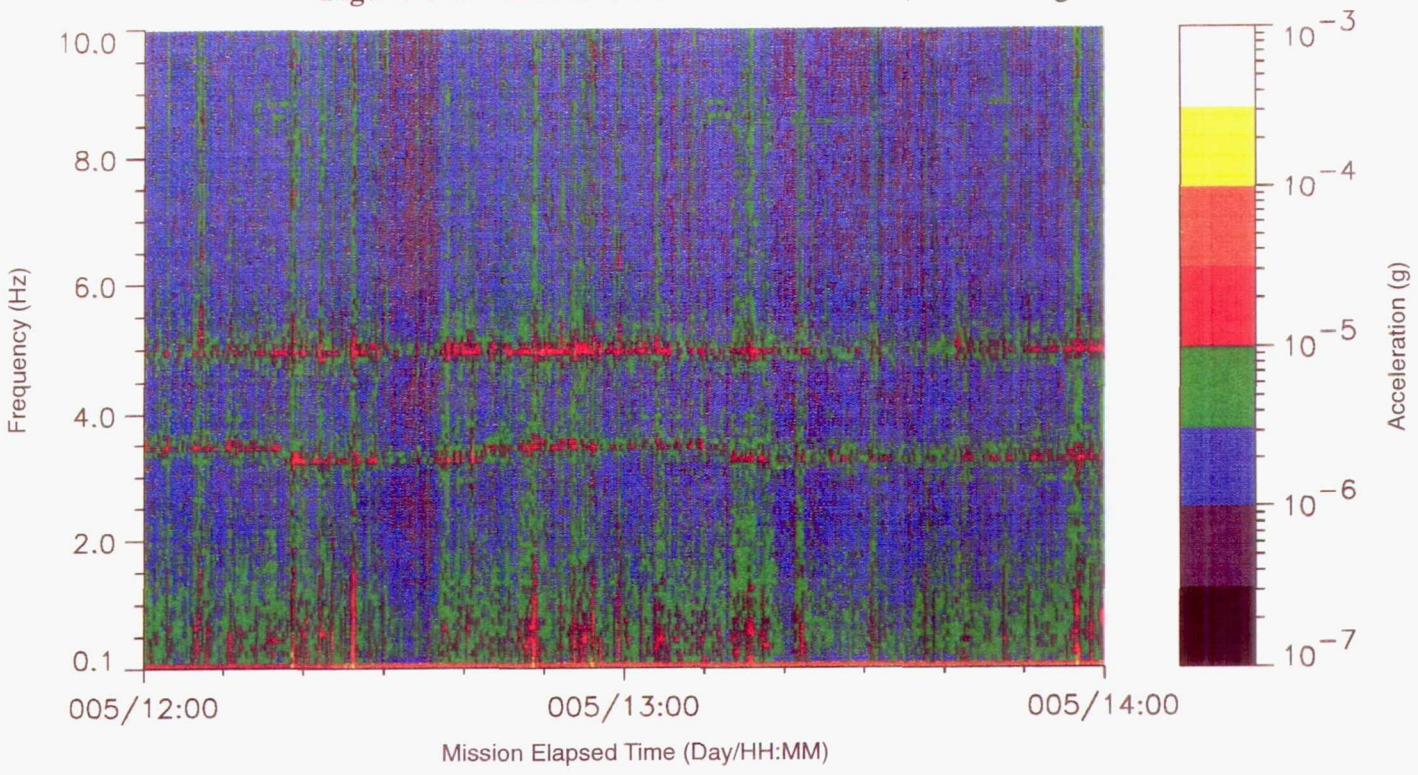

Figure C-60 ATLAS-3 Locker Door MF28E, Vector Magnitude

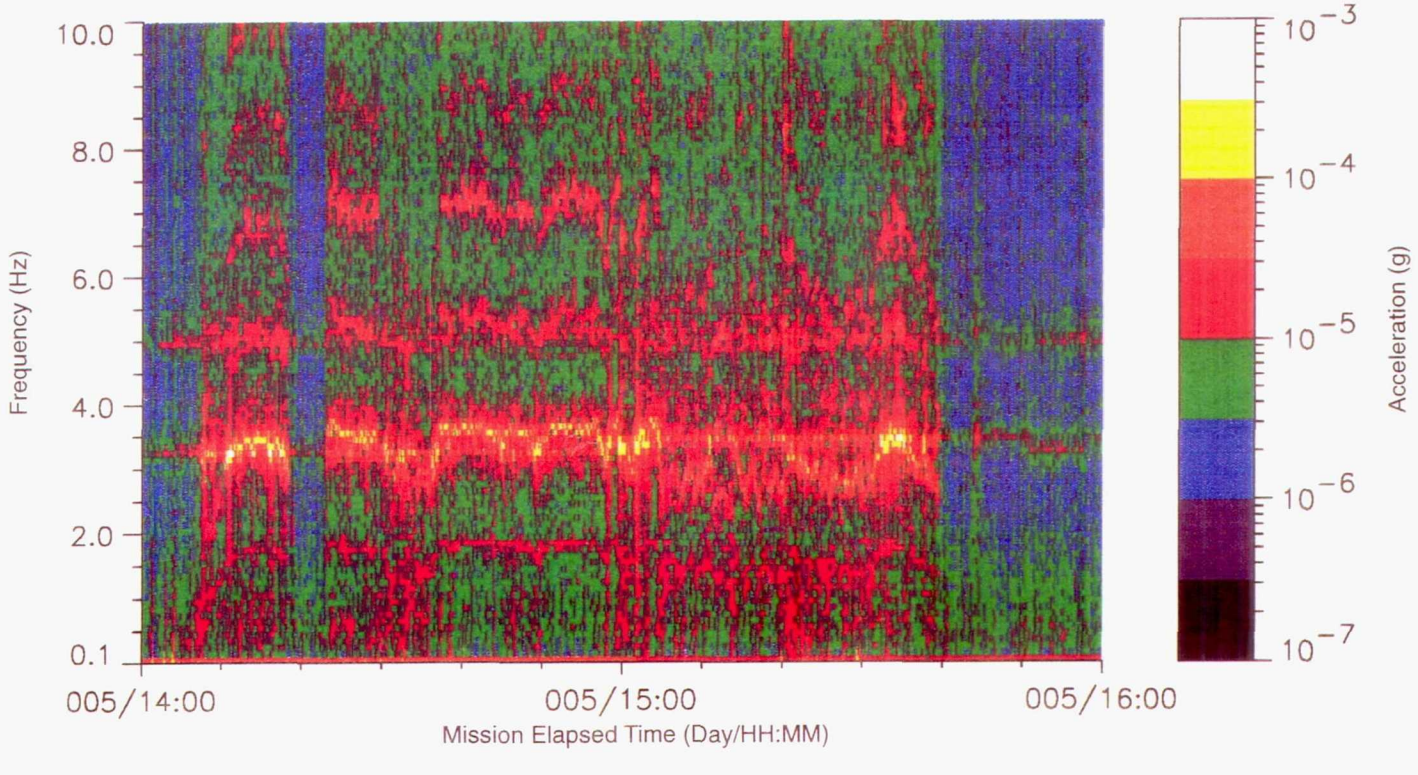

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Figure C-61 ATLAS-3 Locker Door MF28E, Vector Magnitude

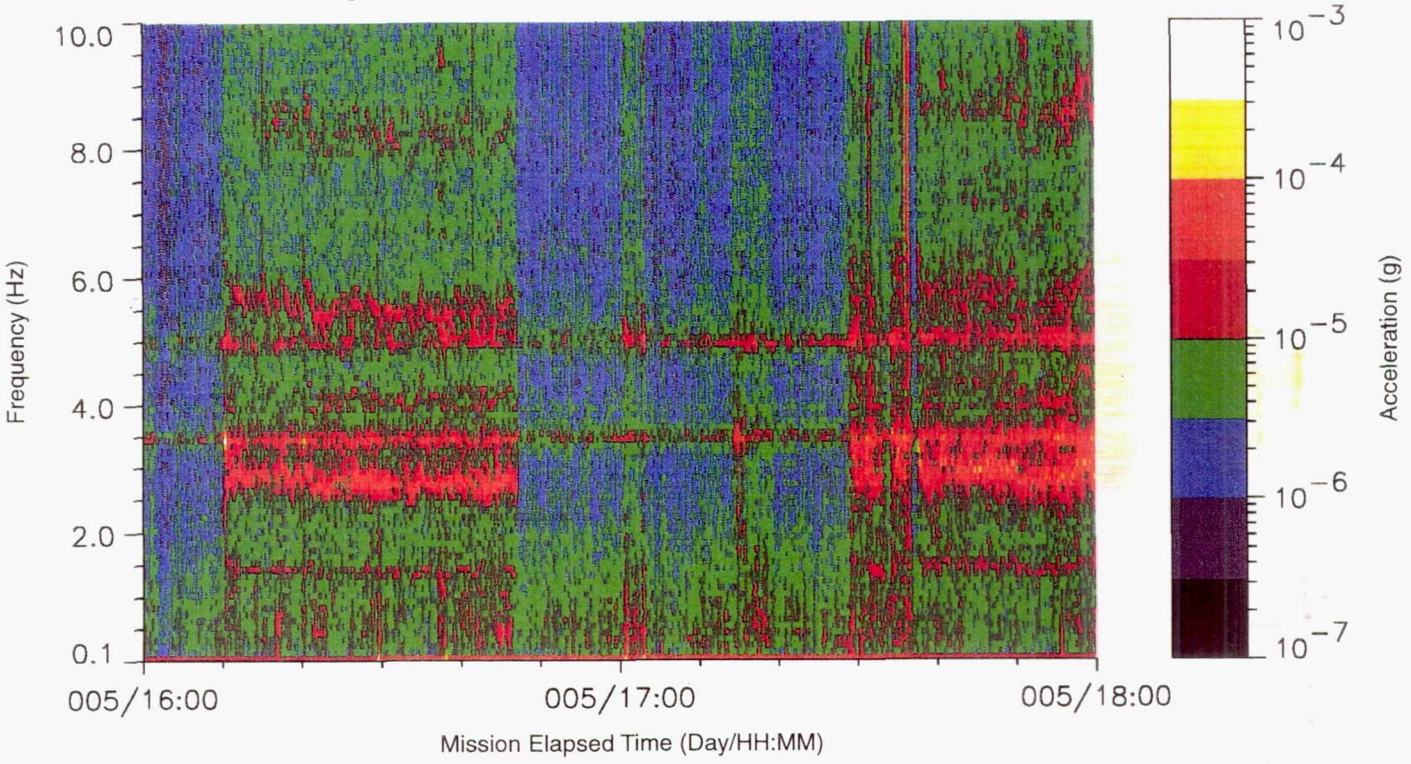

Figure C-62 ATLAS-3 Locker Door MF28E, Vector Magnitude

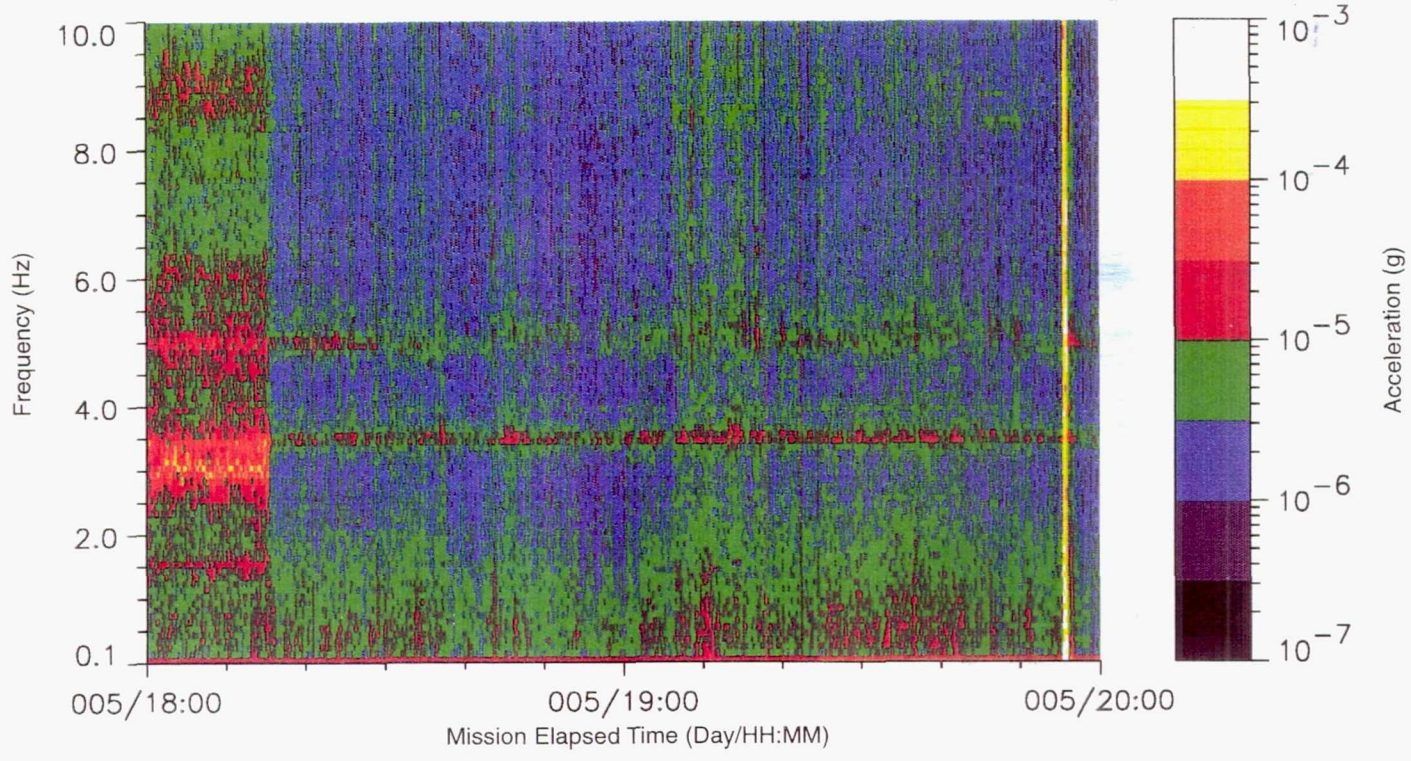

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Figure C-63 ATLAS-3 Locker Door MF28E, Vector Magnitude

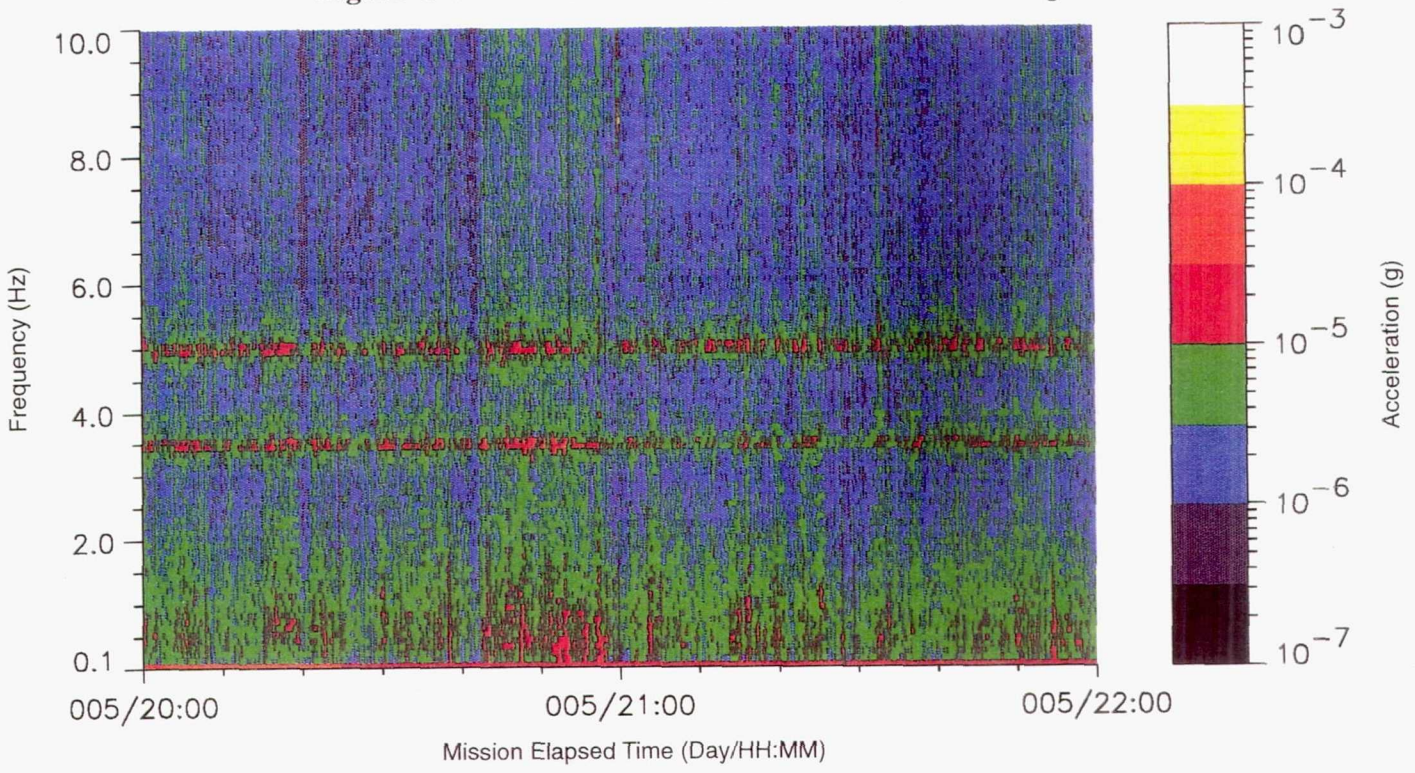

Figure C-64 ATLAS-3 Locker Door MF28E, Vector Magnitude

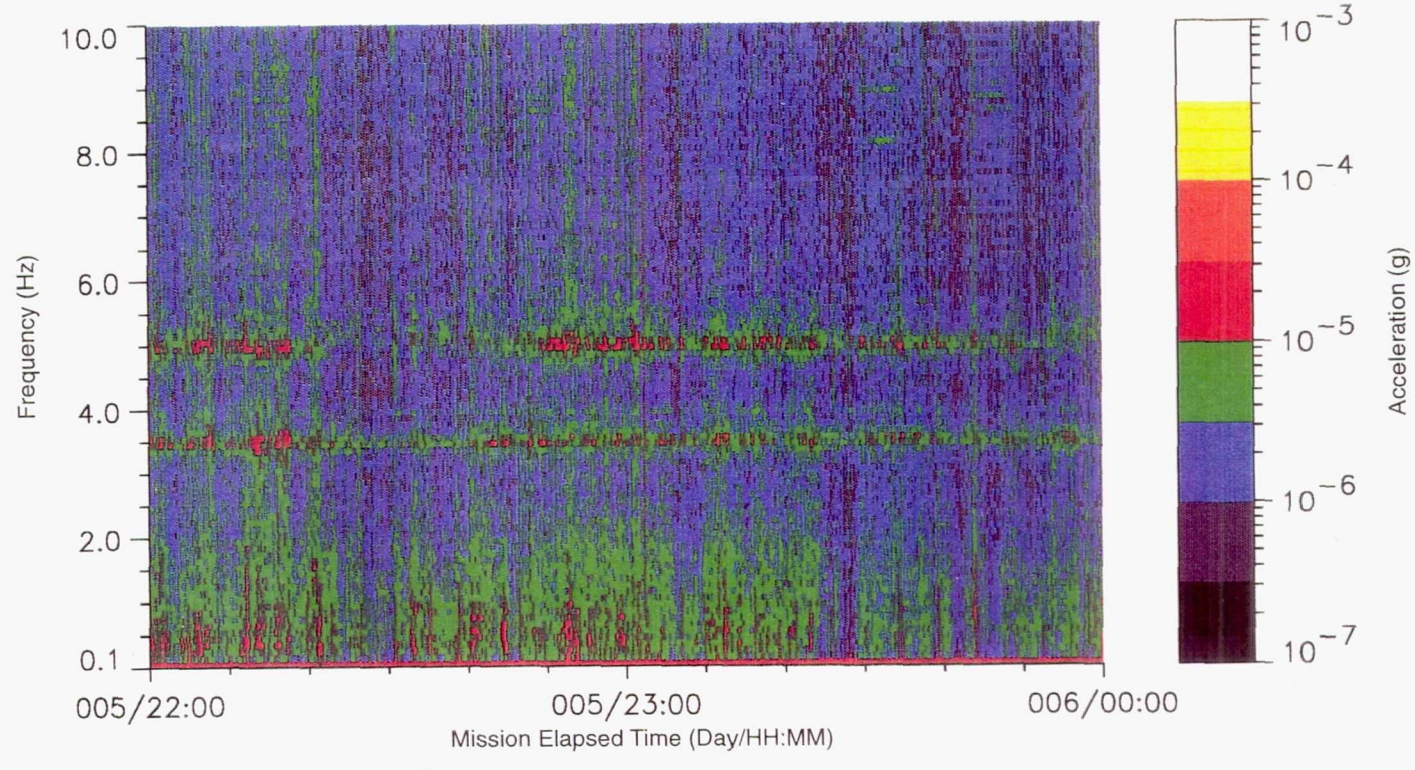

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Figure C-65 ATLAS-3 Locker Door MF28E, Vector Magnitude

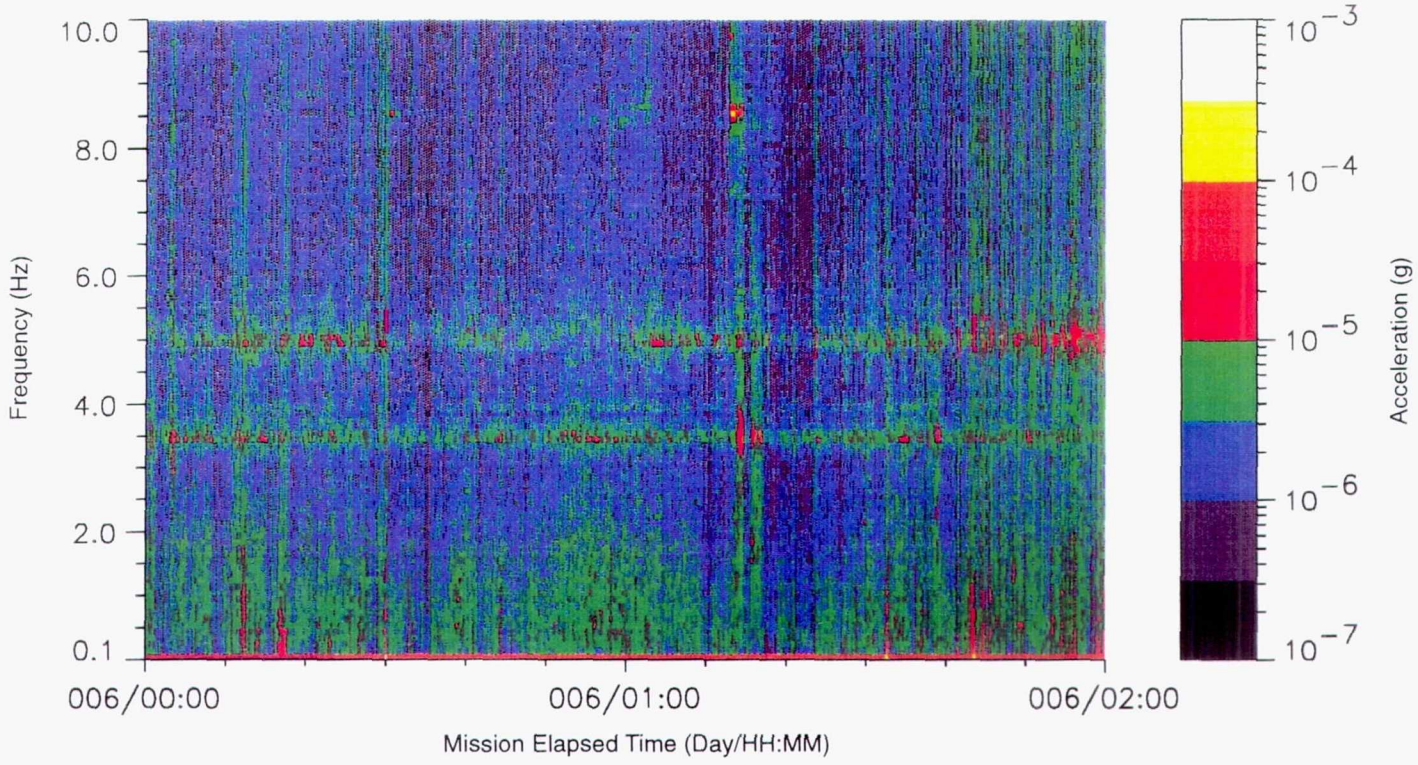

Figure C-66 ATLAS-3 Locker Door MF28E, Vector Magnitude

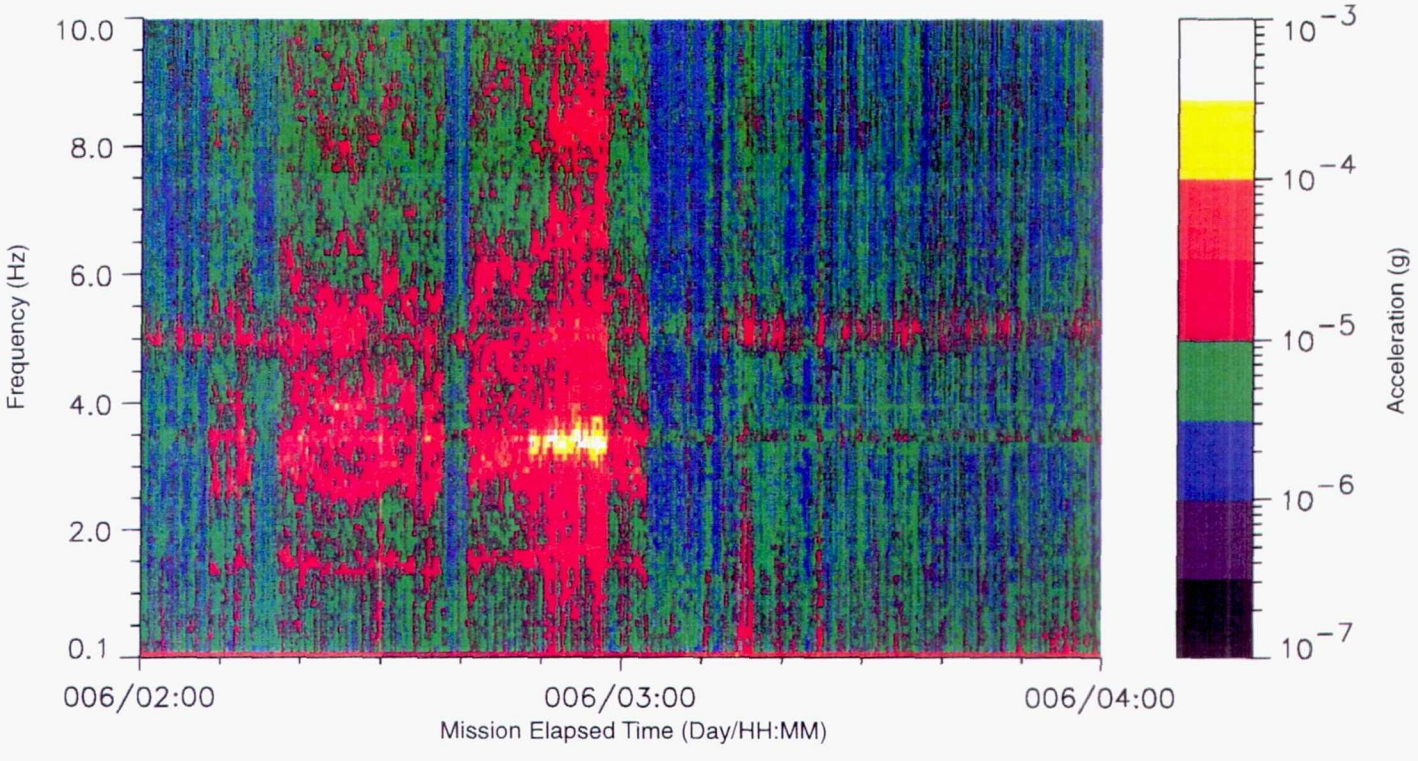

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Figure C-67 ATLAS-3 Locker Door MF28E, Vector Magnitude

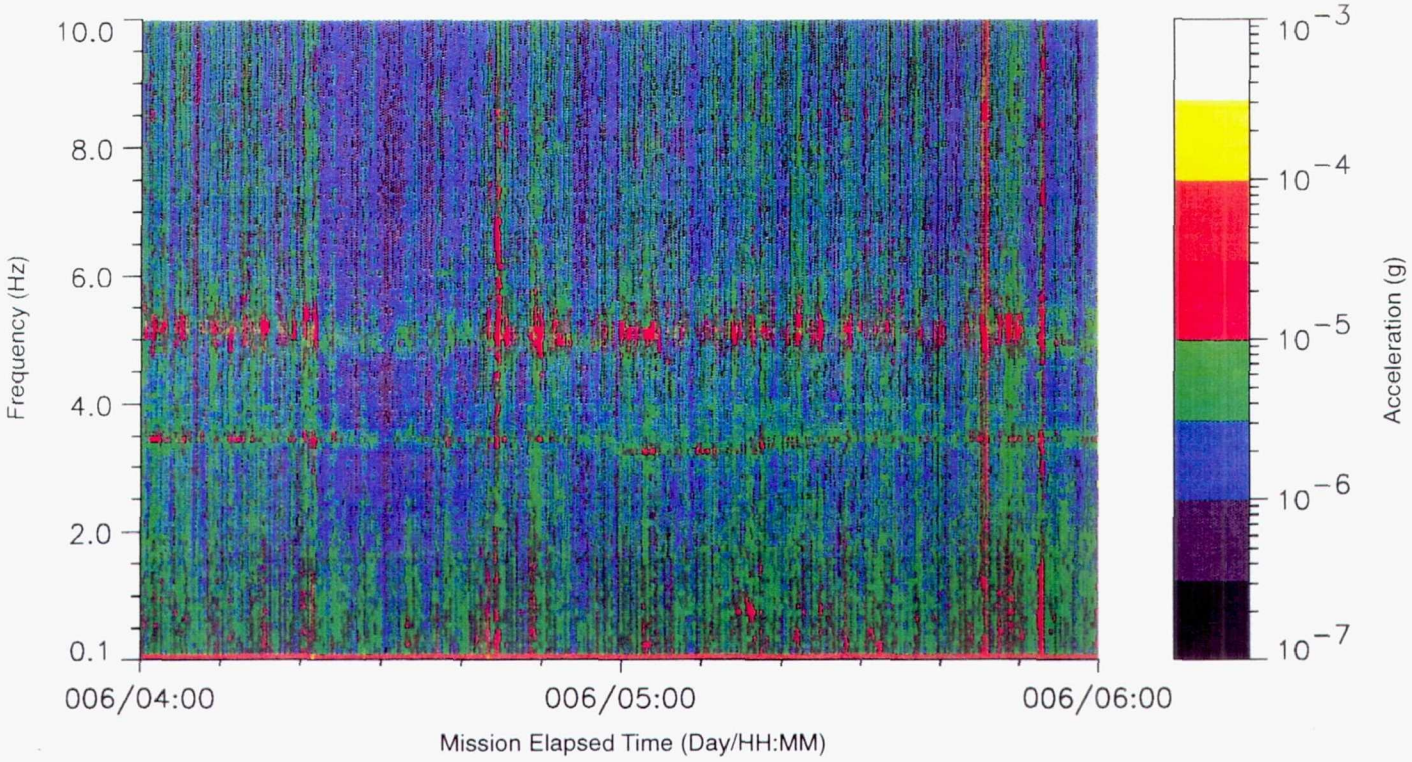

Figure C-68 ATLAS-3 Locker Door MF28E, Vector Magnitude

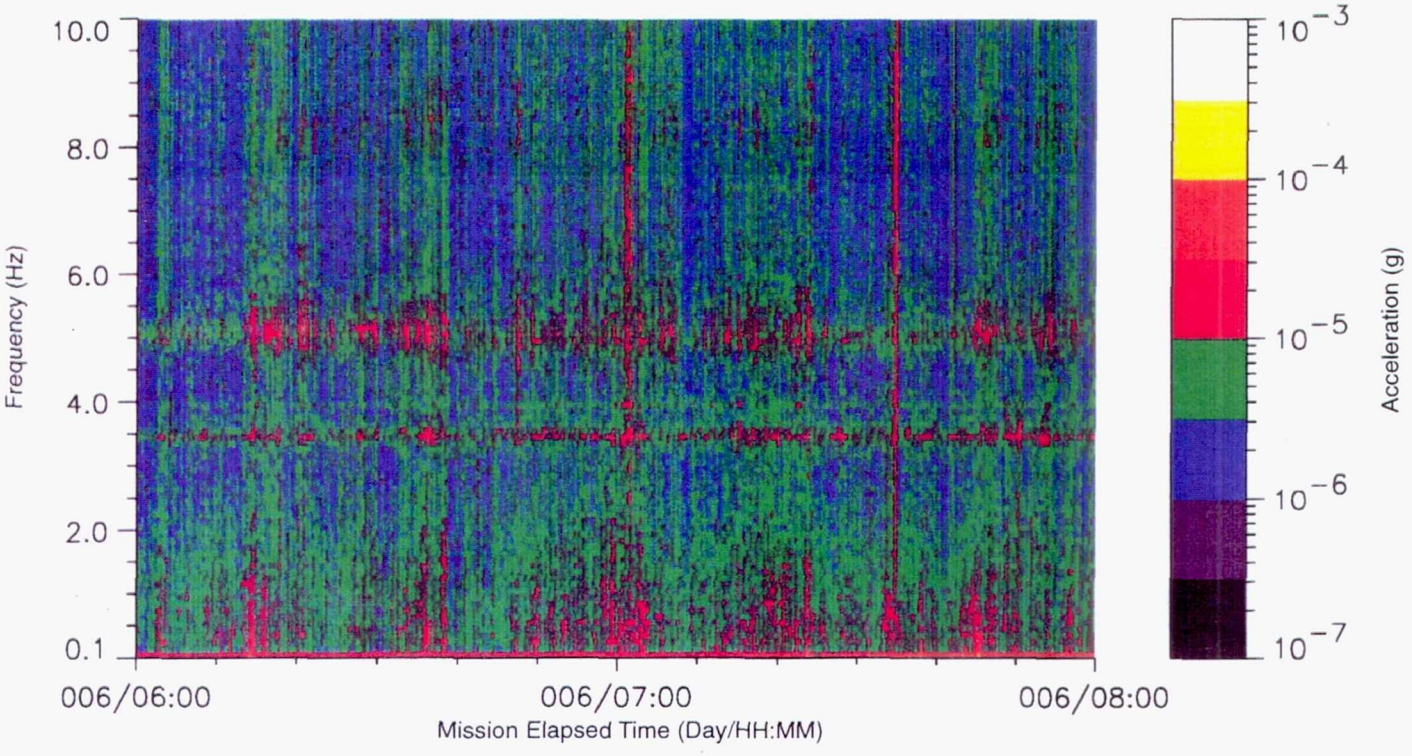

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Figure C-69 ATLAS-3 Locker Door MF28E, Vector Magnitude

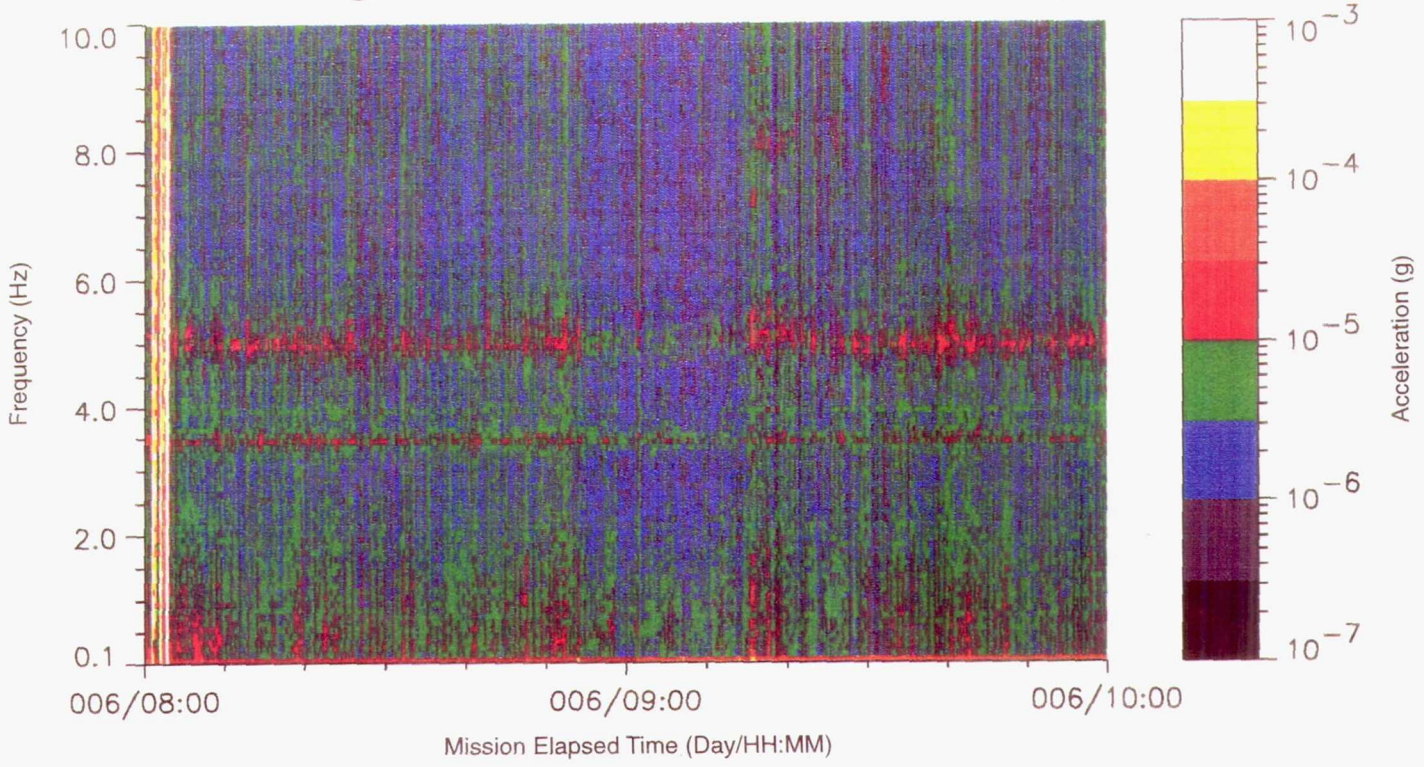

Figure C-70 ATLAS-3 Locker Door MF28E, Vector Magnitude

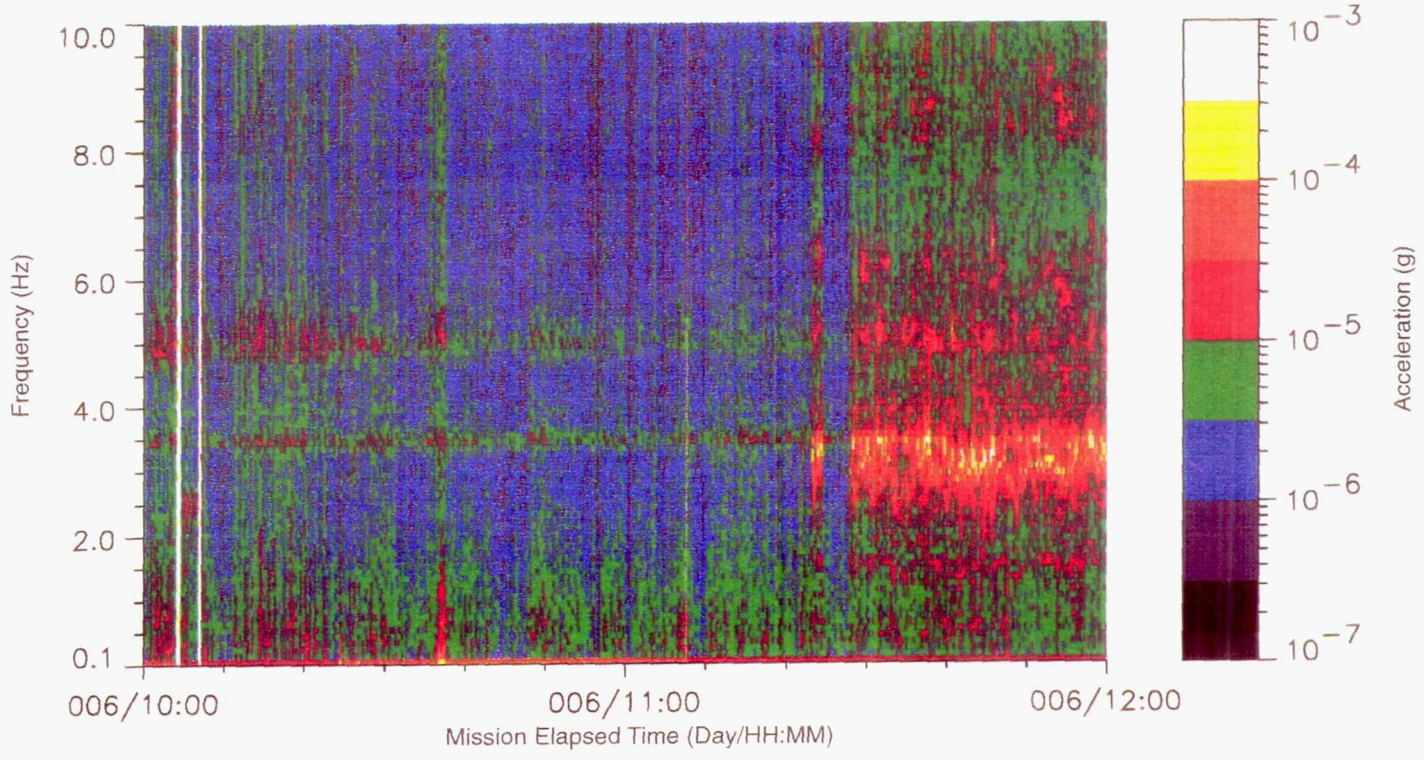

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Figure C-71 ATLAS-3 Locker Door MF28E, Vector Magnitude

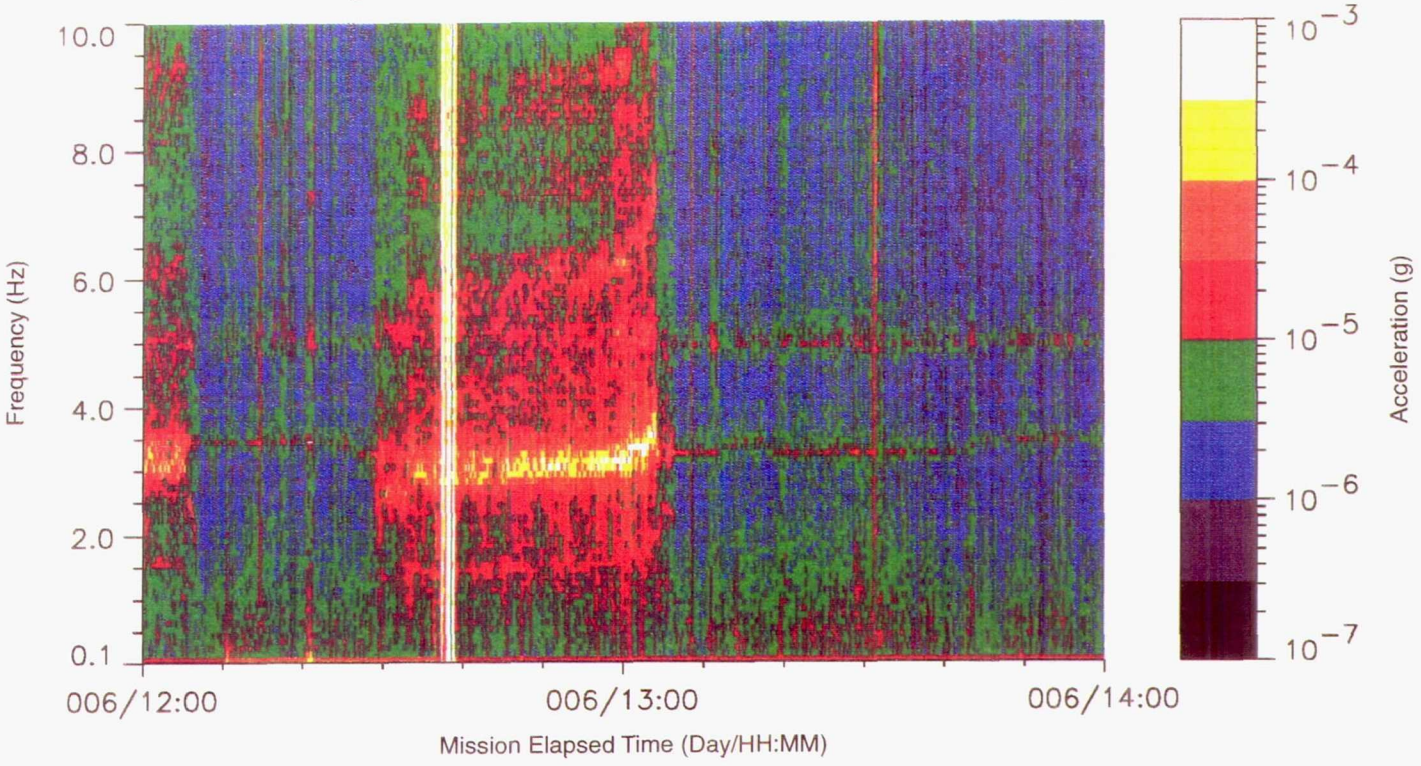

Figure C-72 ATLAS-3 Locker Door MF28E, Vector Magnitude

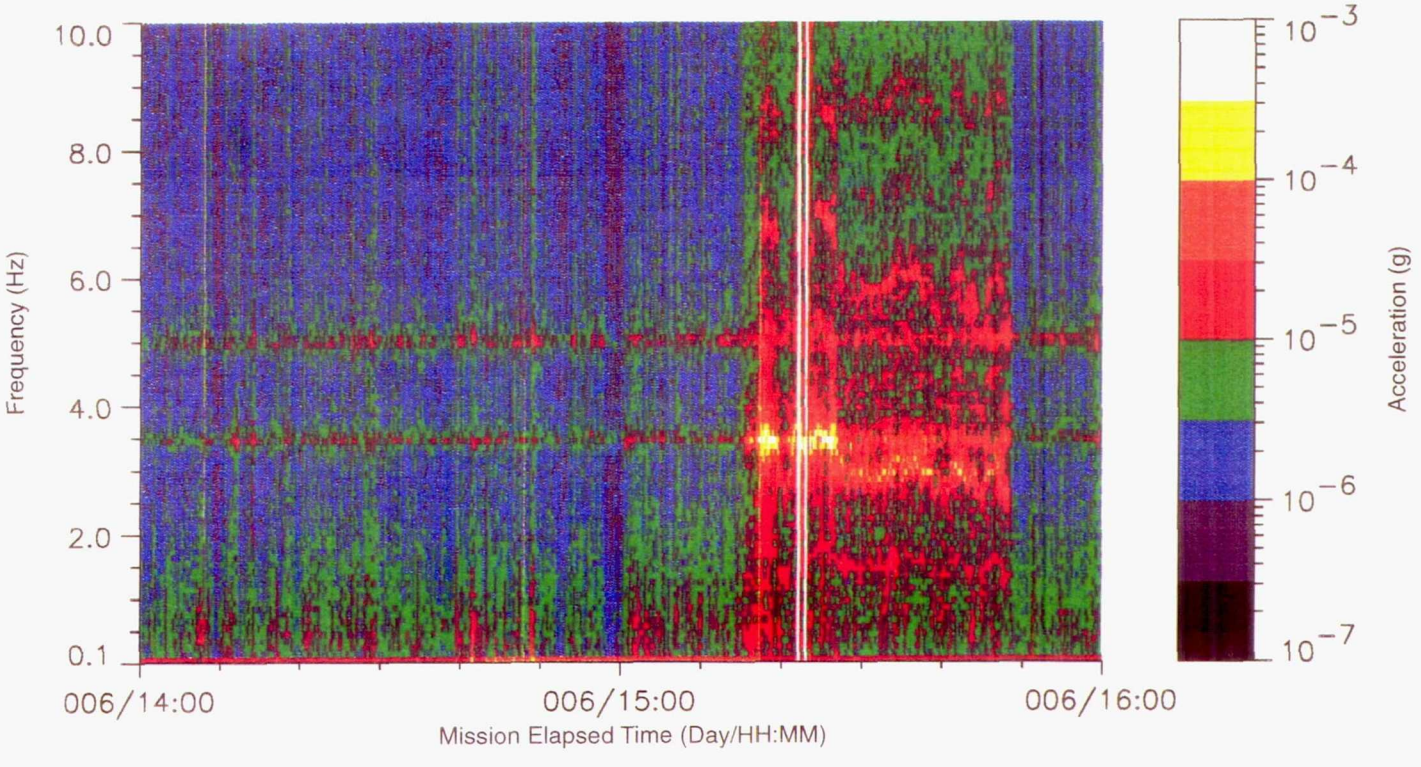

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Figure C-73 ATLAS-3 Locker Door MF28E, Vector Magnitude

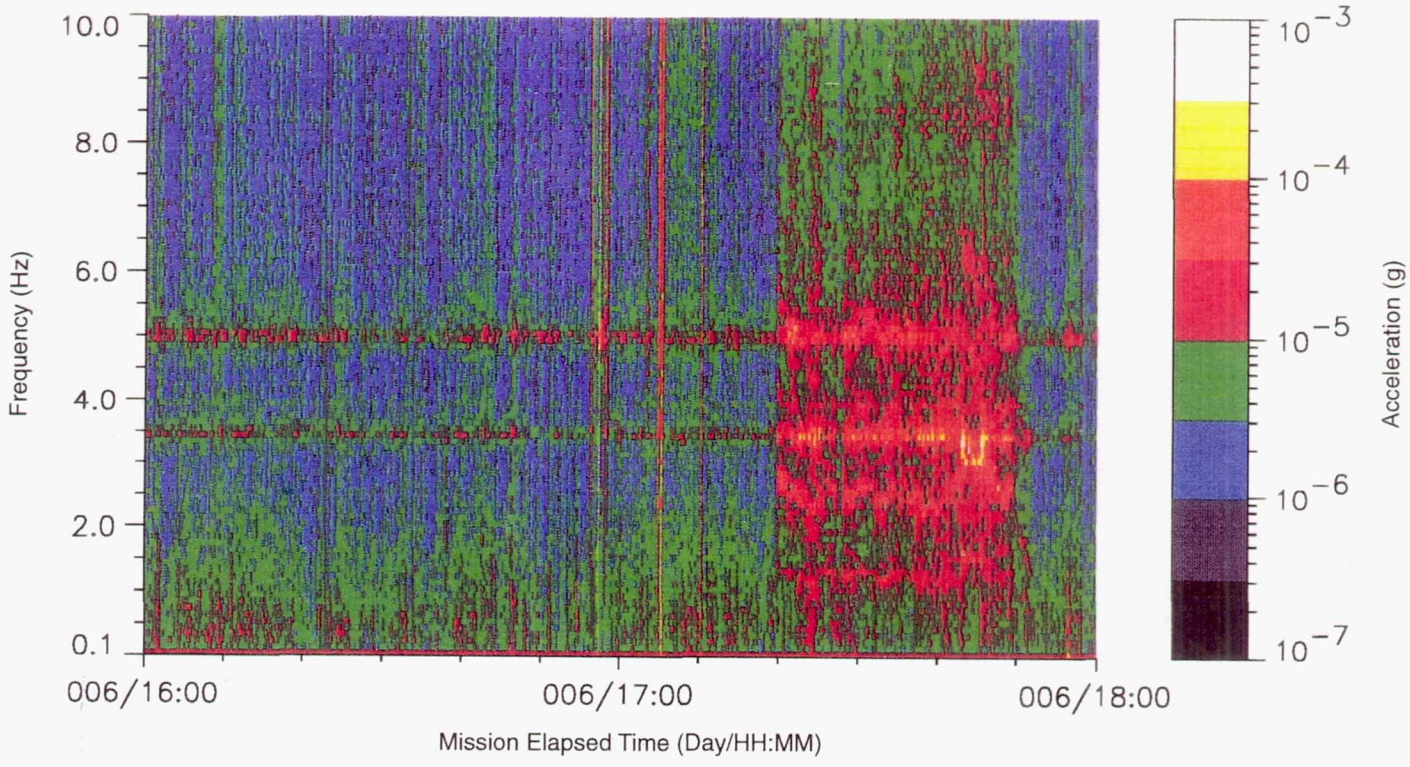

Figure C-74 ATLAS-3 Locker Door MF28E, Vector Magnitude

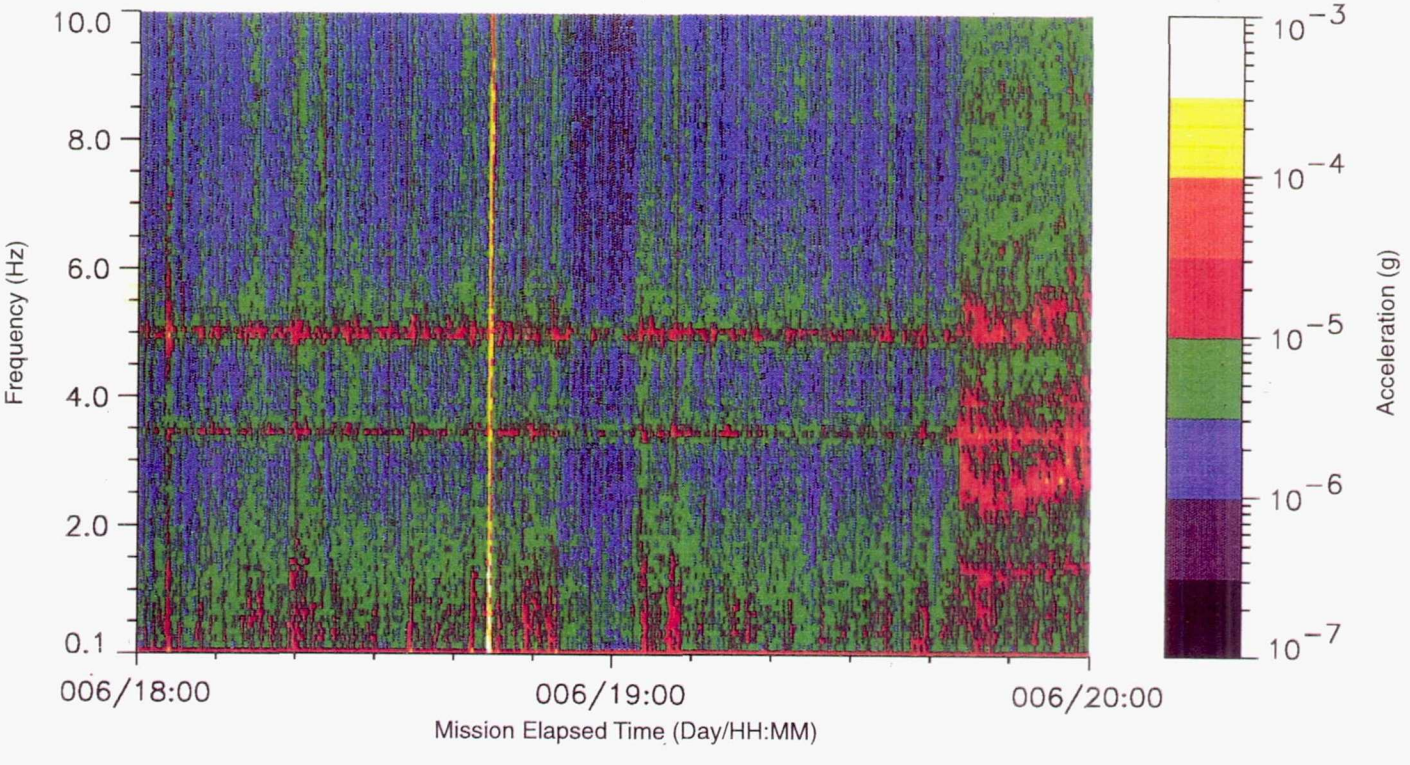

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Figure C-75 ATLAS-3 Locker Door MF28E, Vector Magnitude

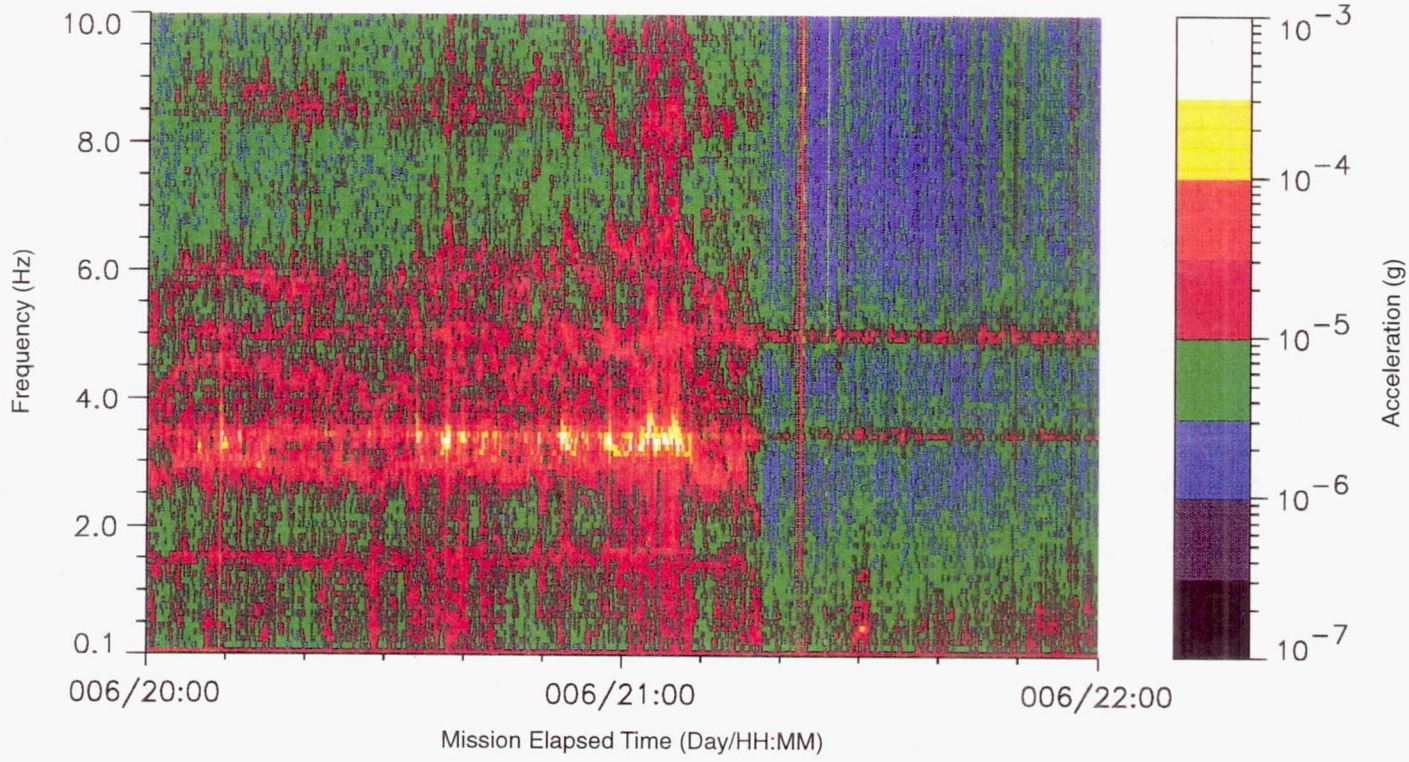

Figure C-76 ATLAS-3 Locker Door MF28E, Vector Magnitude

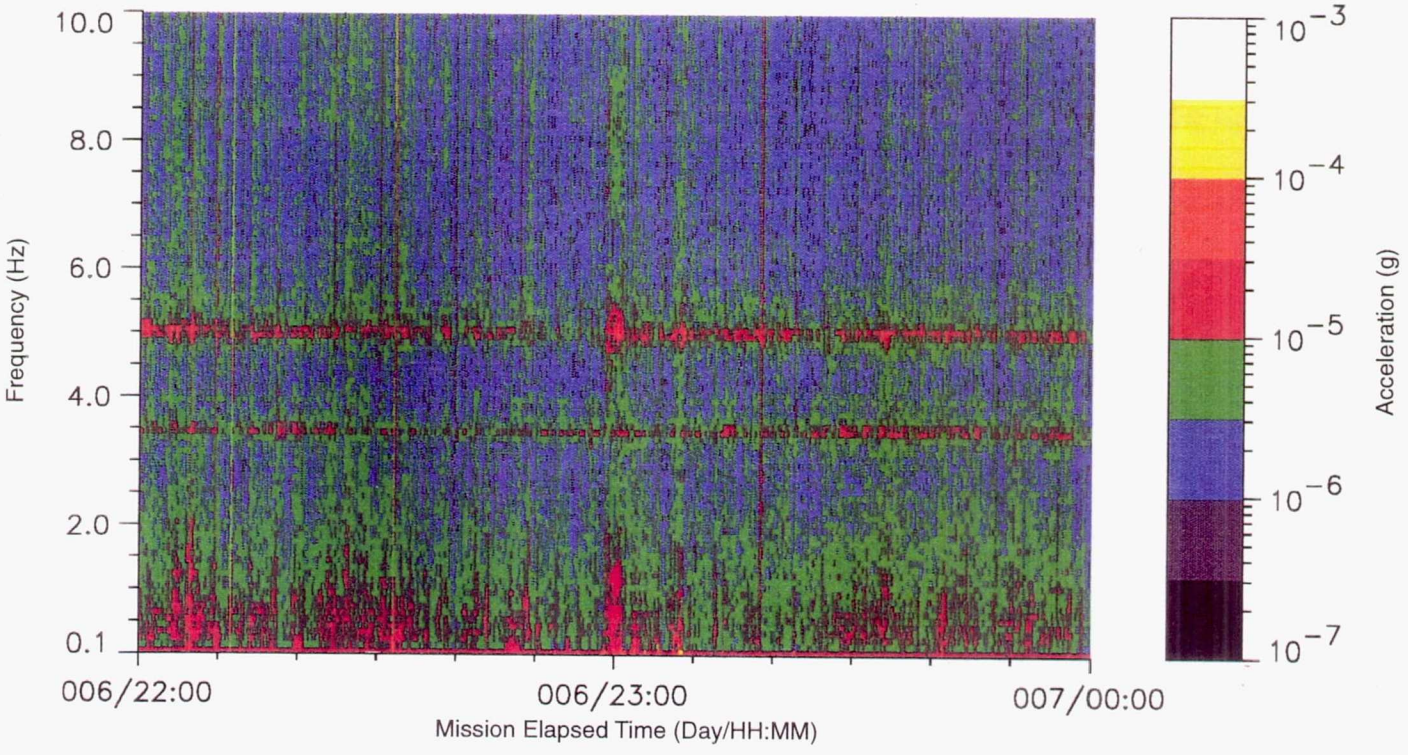

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Figure C-77 ATLAS-3 Locker Door MF28E, Vector Magnitude

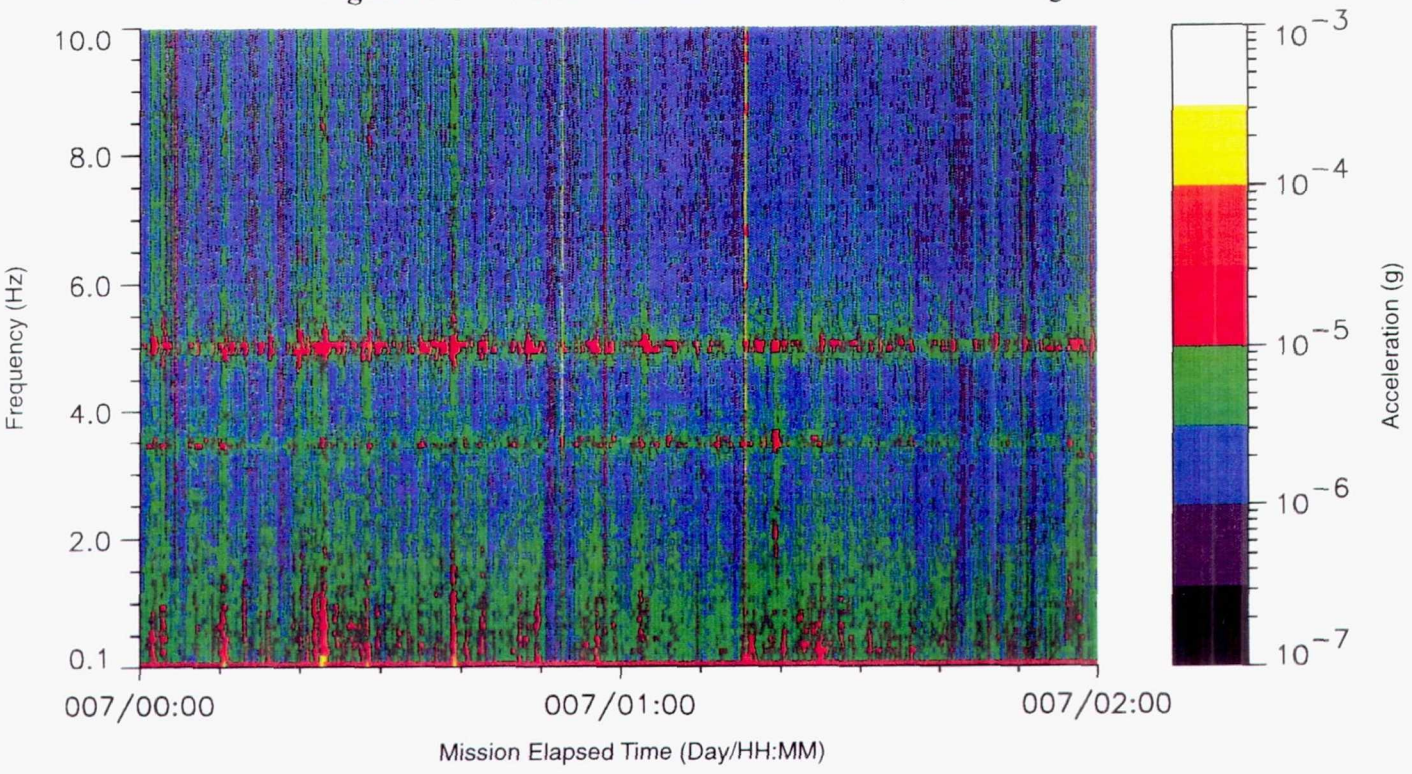

Figure C-78 ATLAS-3 Locker Door MF28E, Vector Magnitude

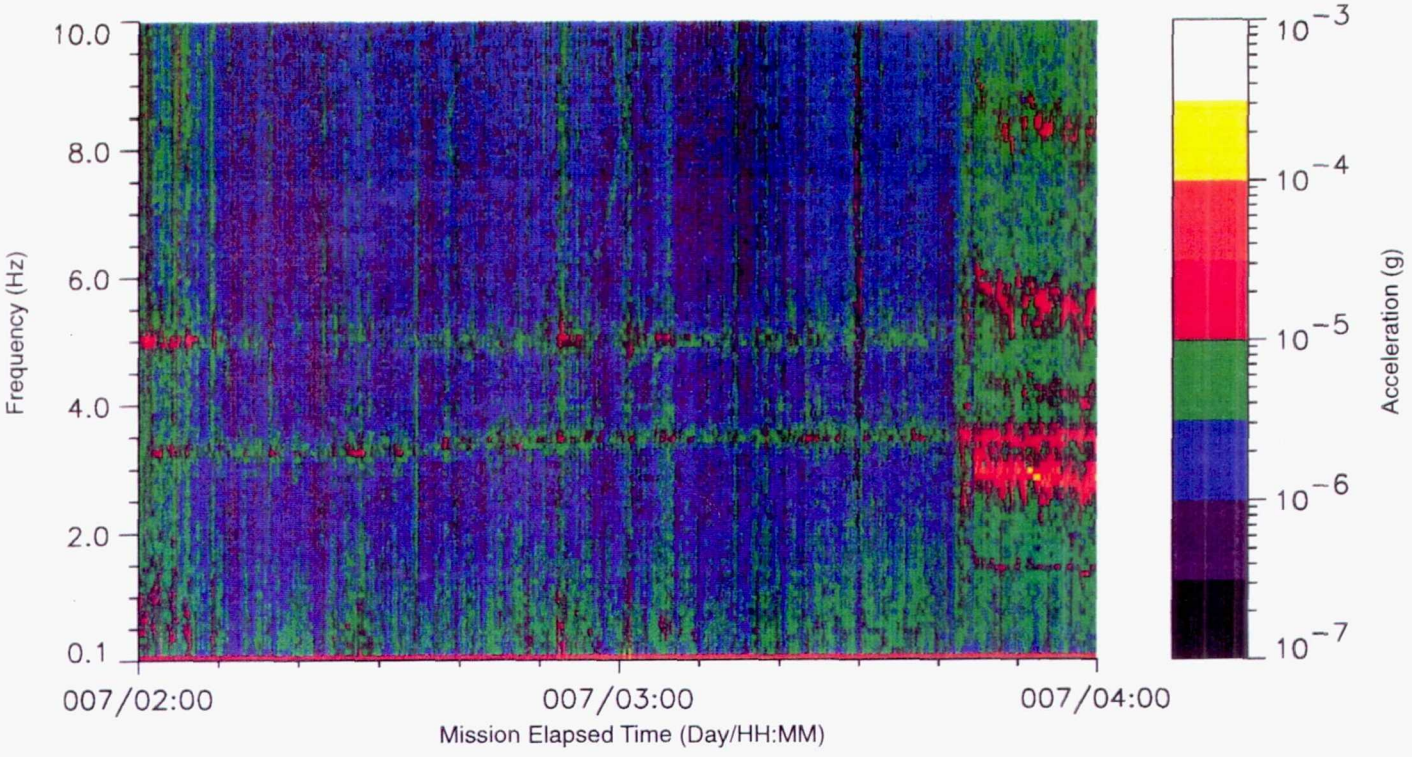

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Figure C-79 ATLAS-3 Locker Door MF28E, Vector Magnitude

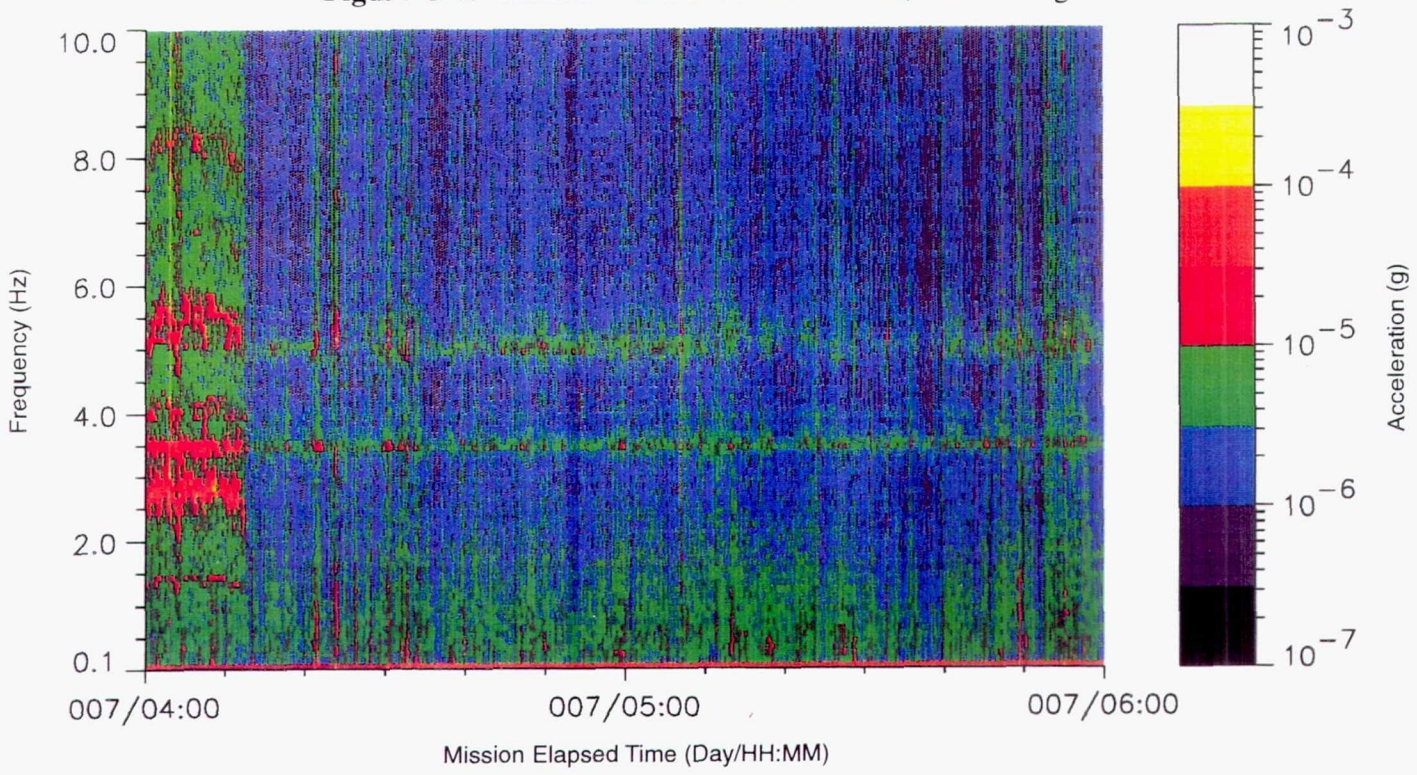

Figure C-80 ATLAS-3 Locker Door MF28E, Vector Magnitude

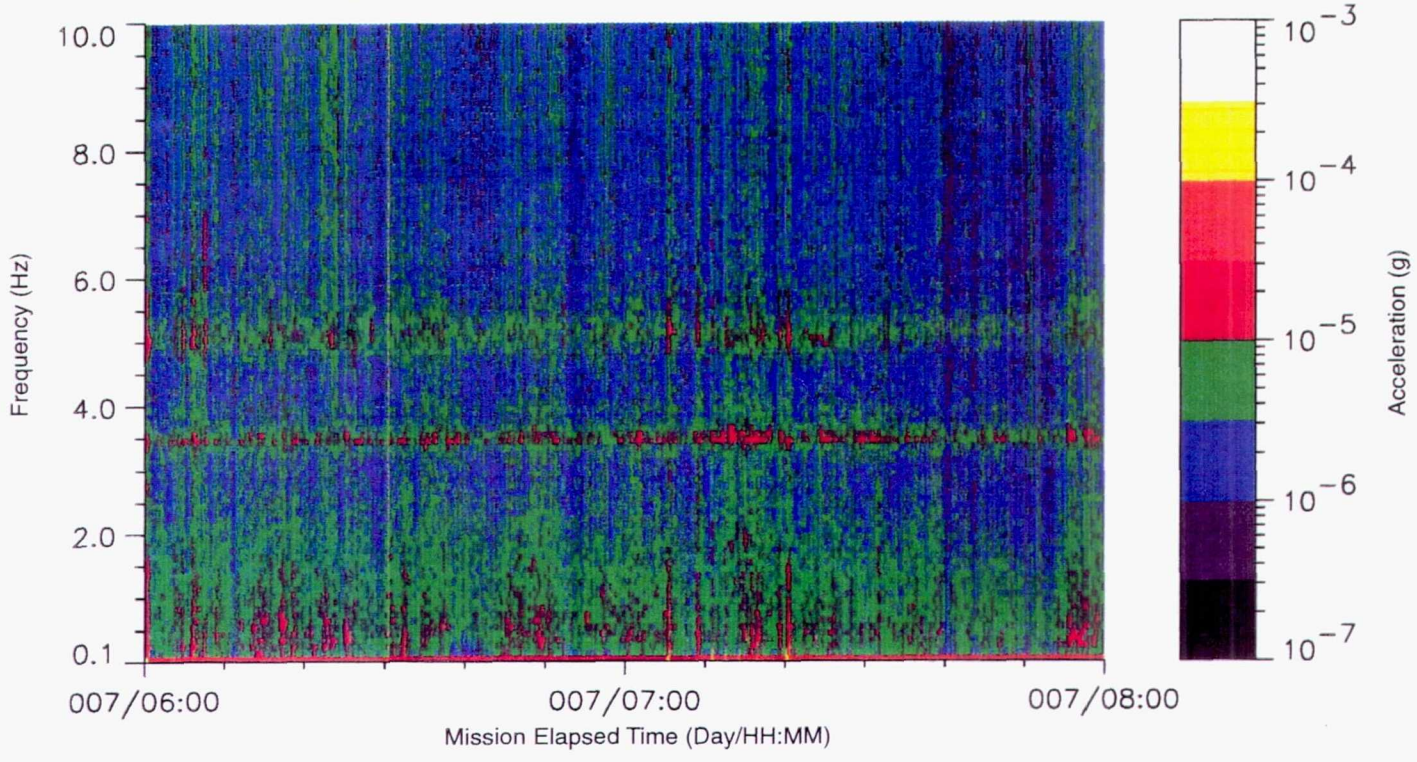

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Figure C-81 ATLAS-3 Locker Door MF28E, Vector Magnitude

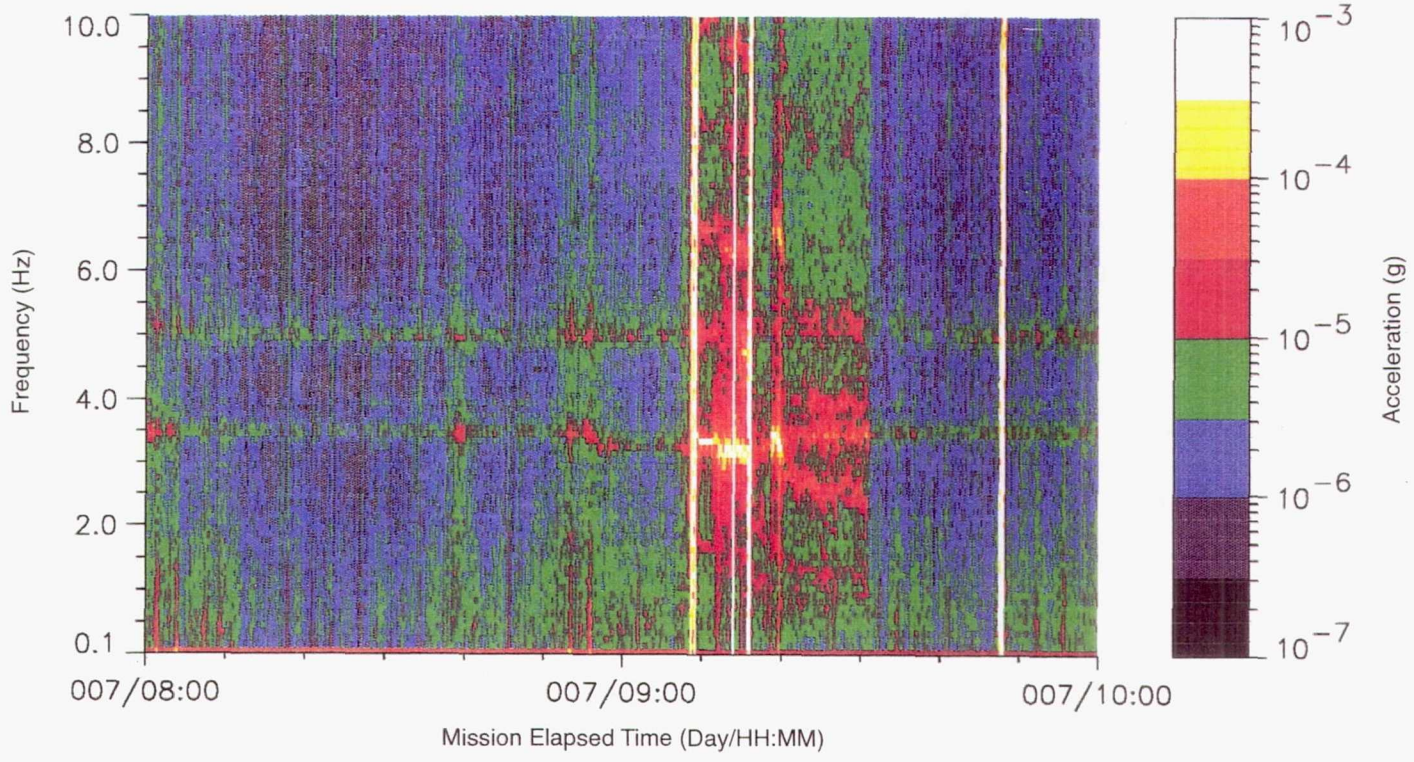

Figure C-82 ATLAS-3 Locker Door MF28E, Vector Magnitude

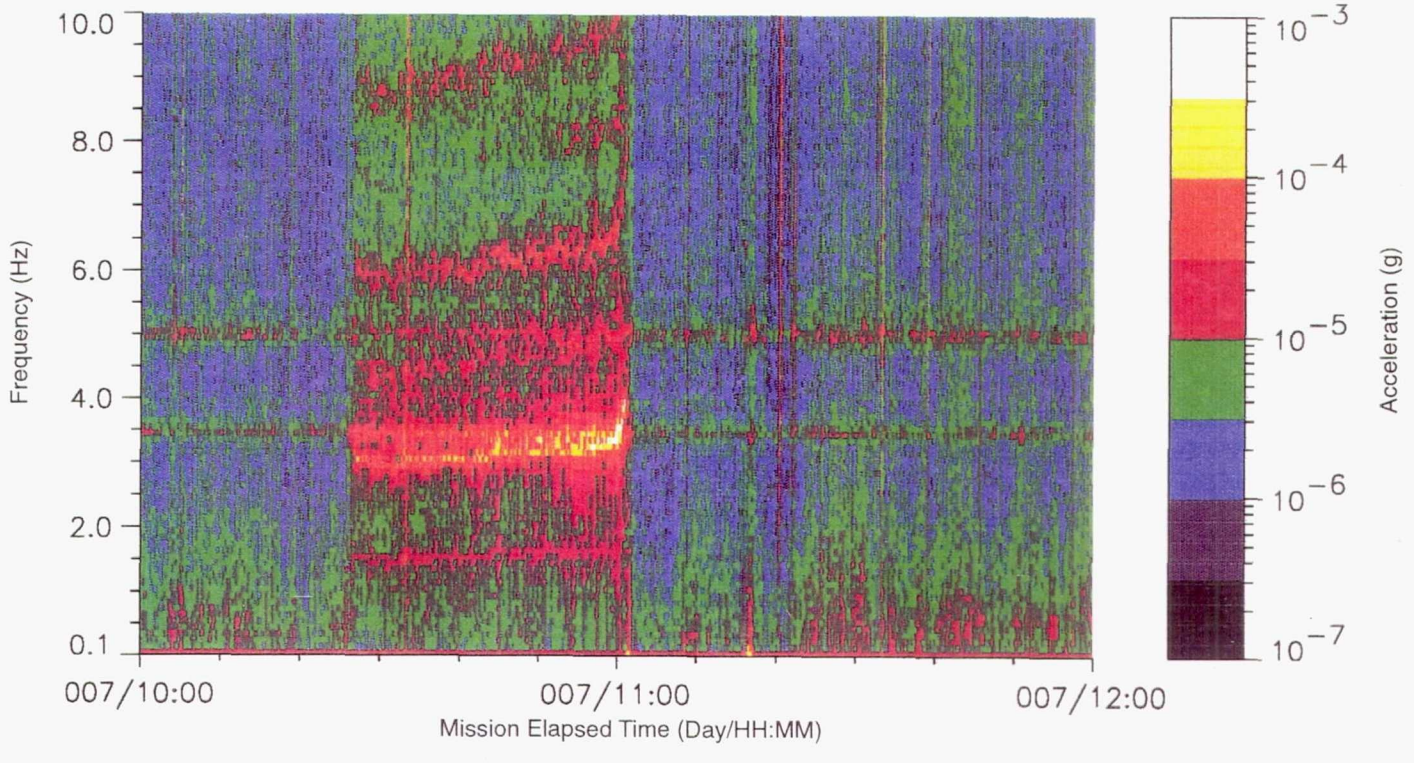

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Figure C-83 ATLAS-3 Locker Door MF28E, Vector Magnitude

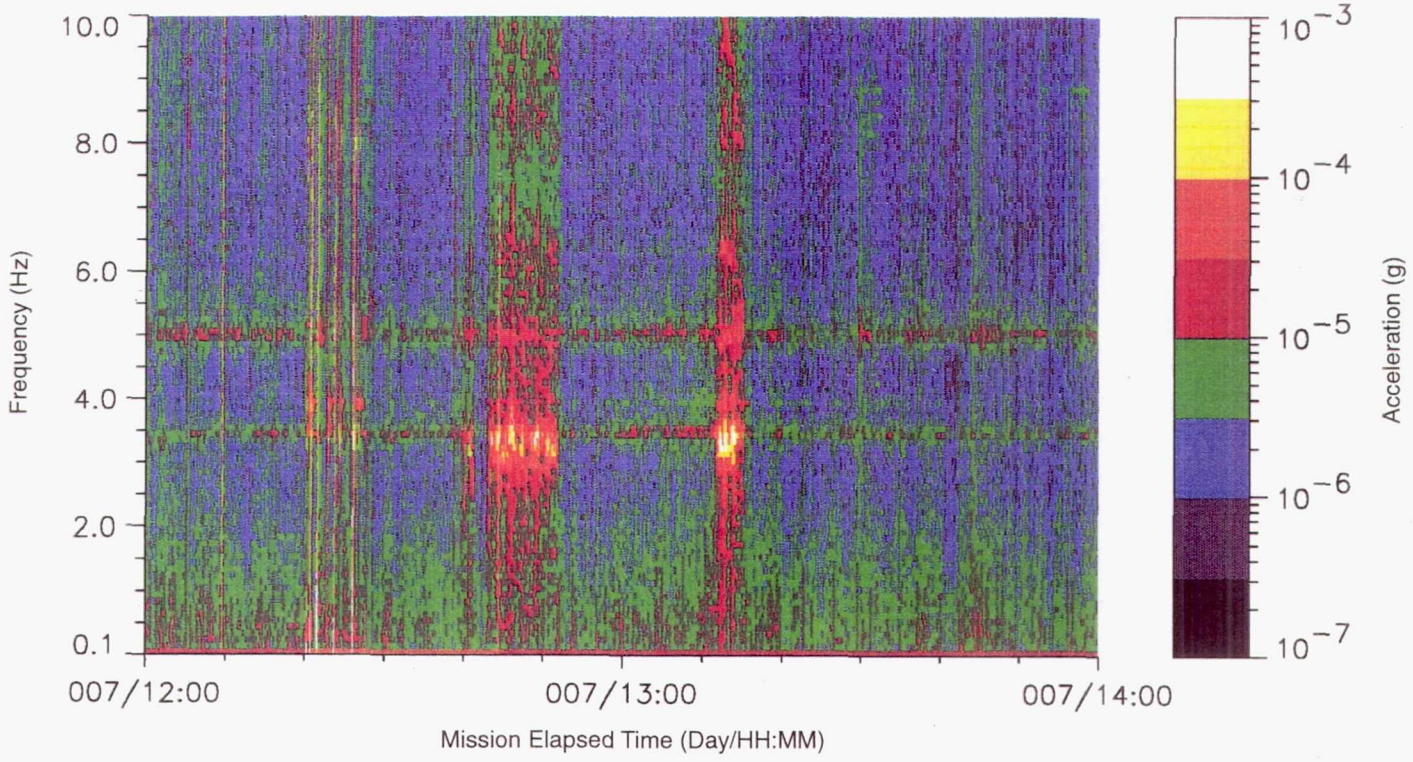

Figure C-84 ATLAS-3 Locker Door MF28E, Vector Magnitude

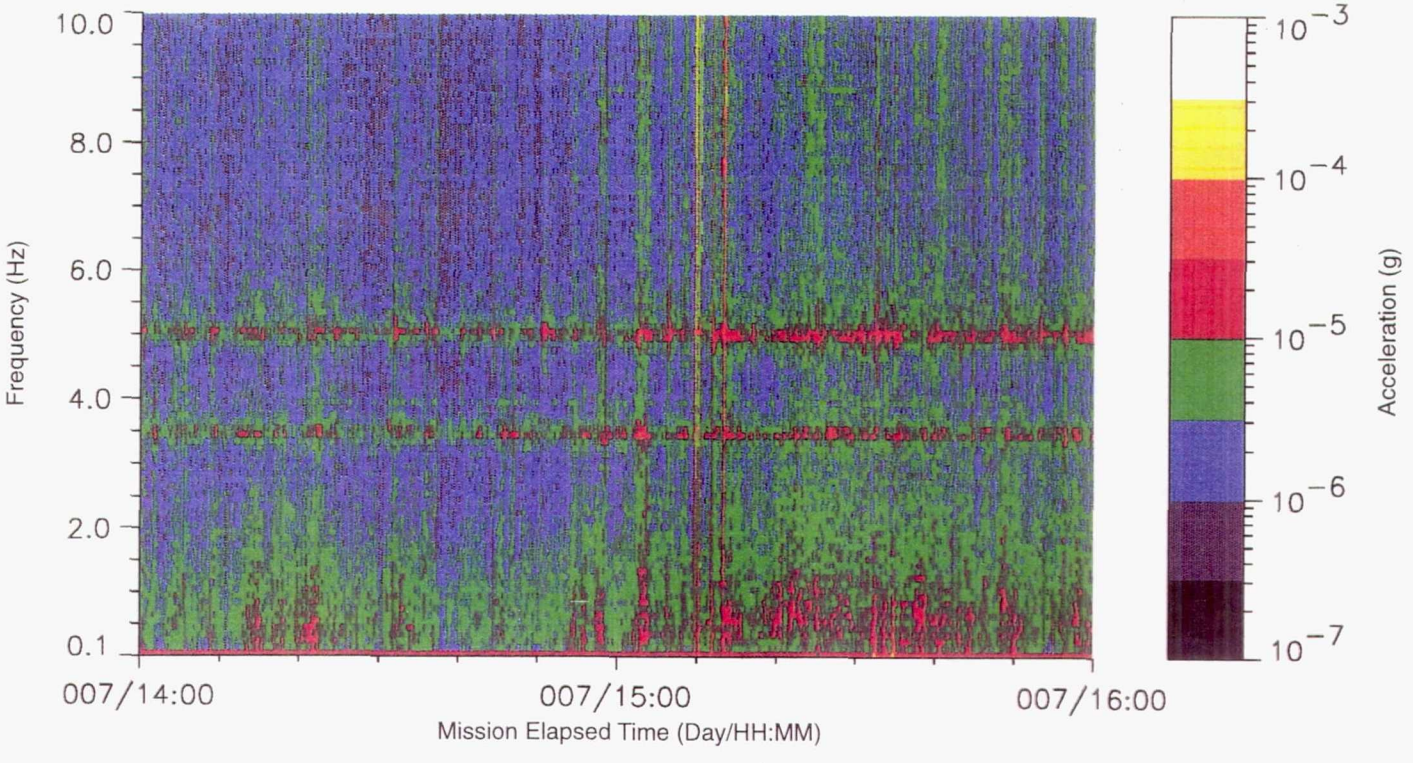

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Figure C-85 ATLAS-3 Locker Door MF28E, Vector Magnitude

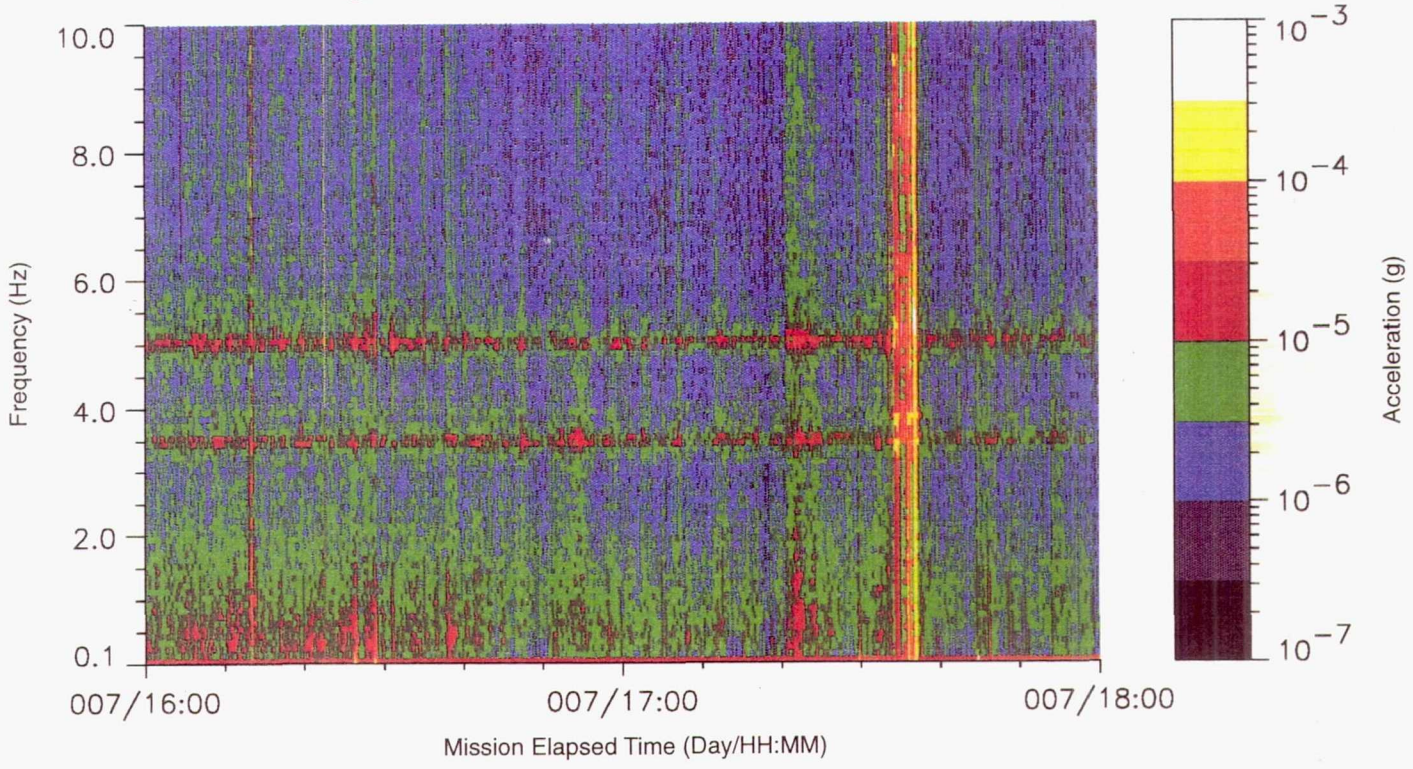

Figure C-86 ATLAS-3 Locker Door MF28E, Vector Magnitude

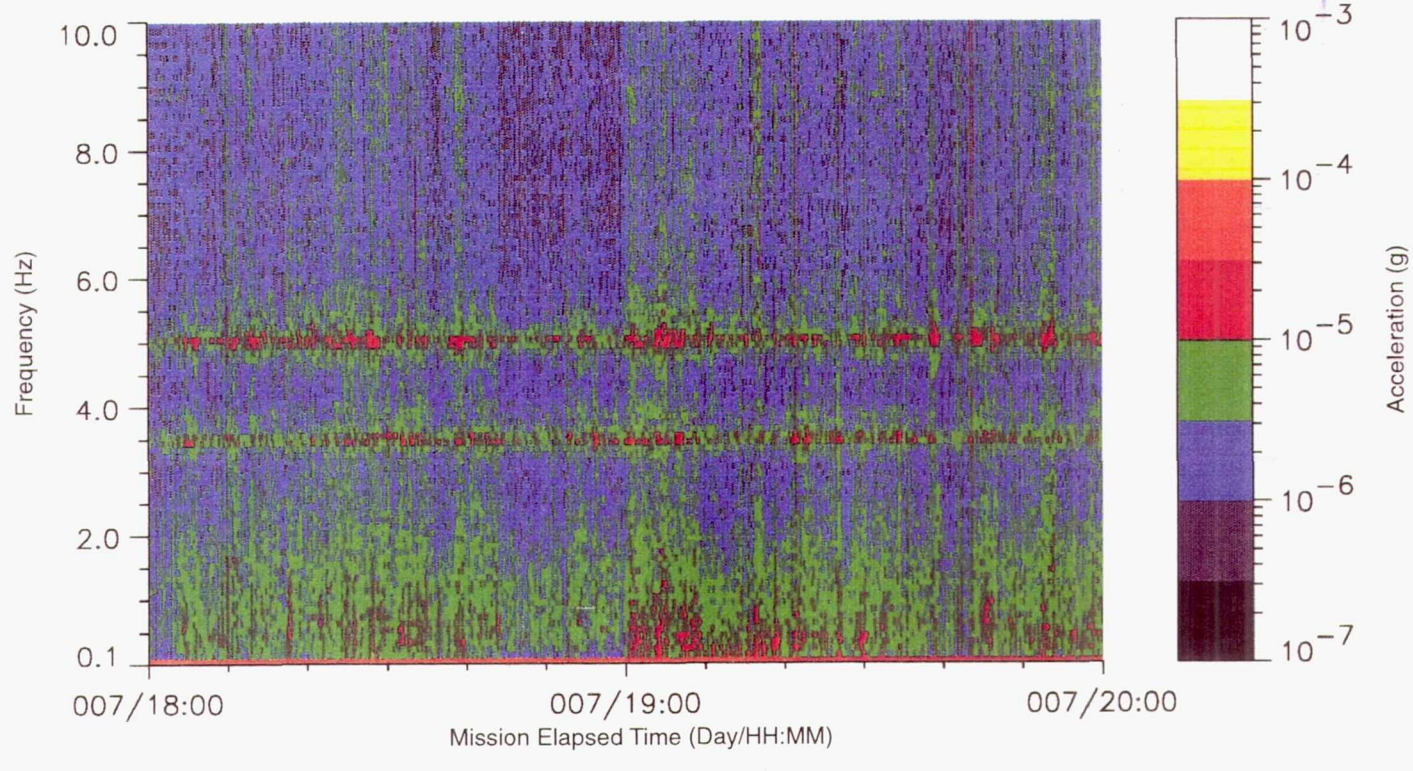

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Figure C-87 ATLAS-3 Locker Door MF28E, Vector Magnitude

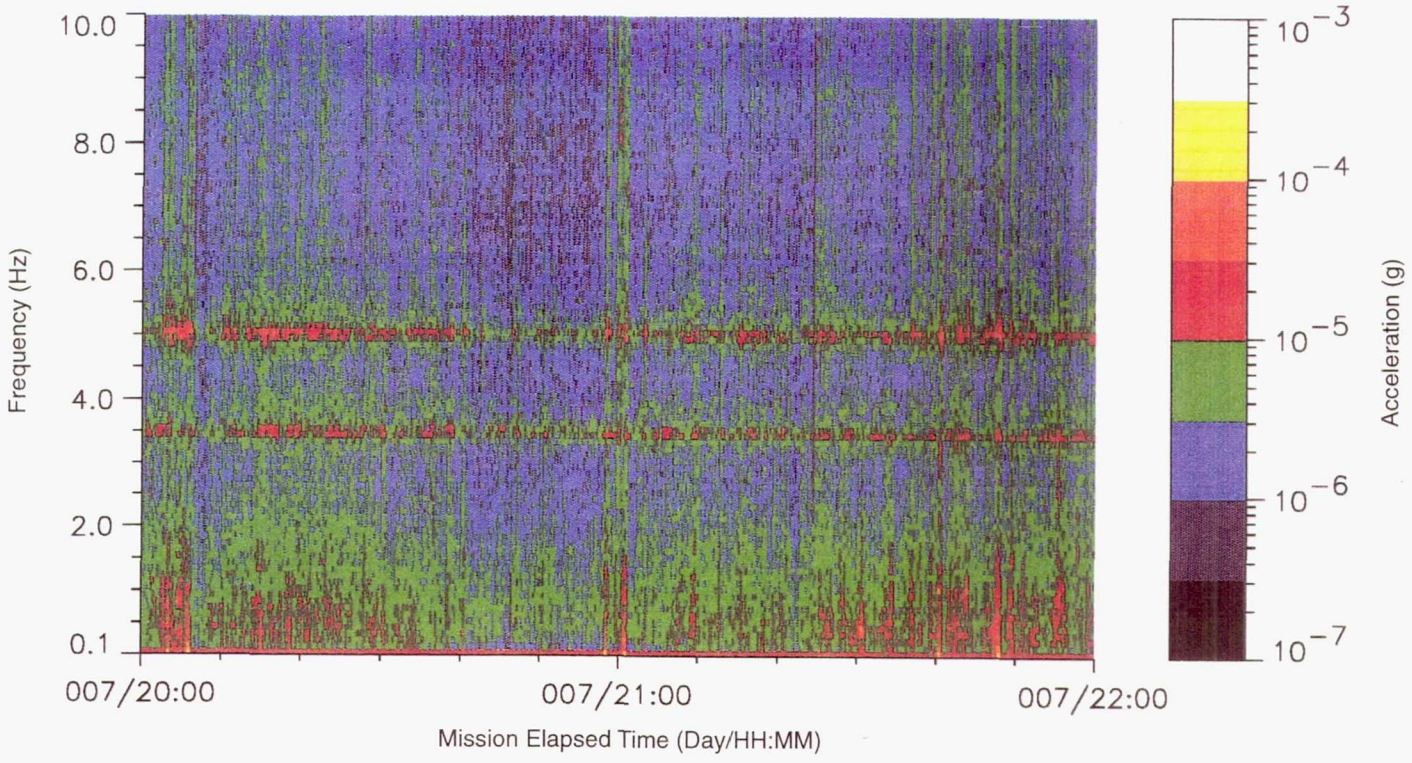

Figure C-88 ATLAS-3 Locker Door MF28E, Vector Magnitude

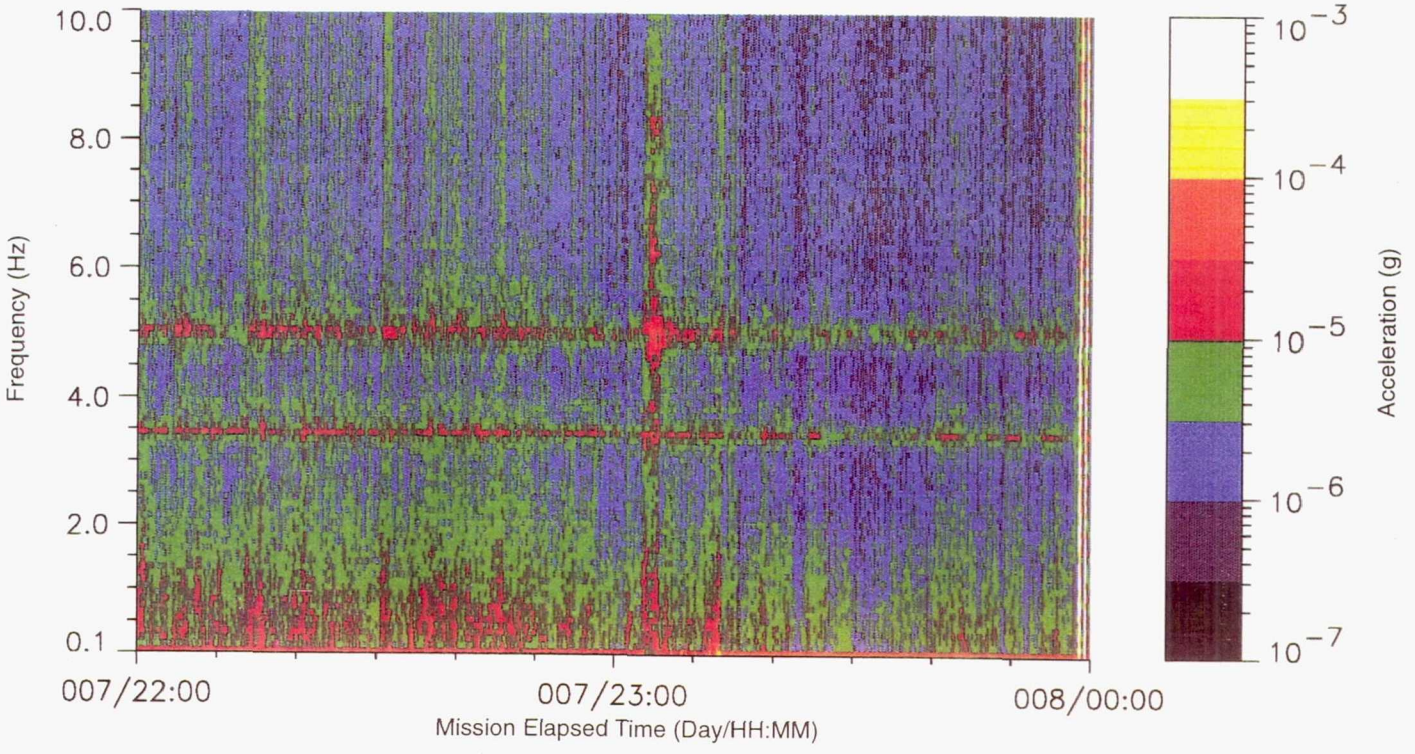

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Figure C-89 ATLAS-3 Locker Door MF28E, Vector Magnitude

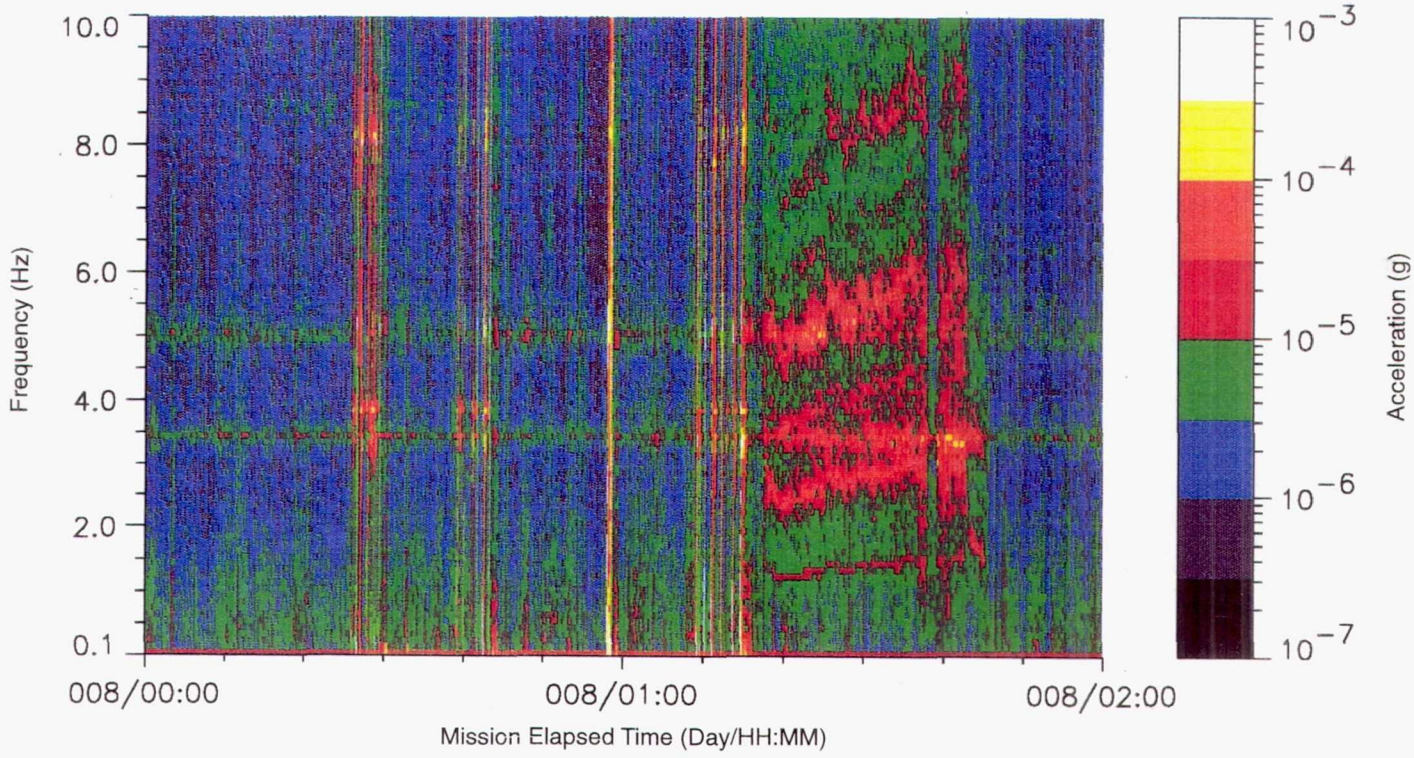

Figure C-90 ATLAS-3 Locker Door MF28E, Vector Magnitude

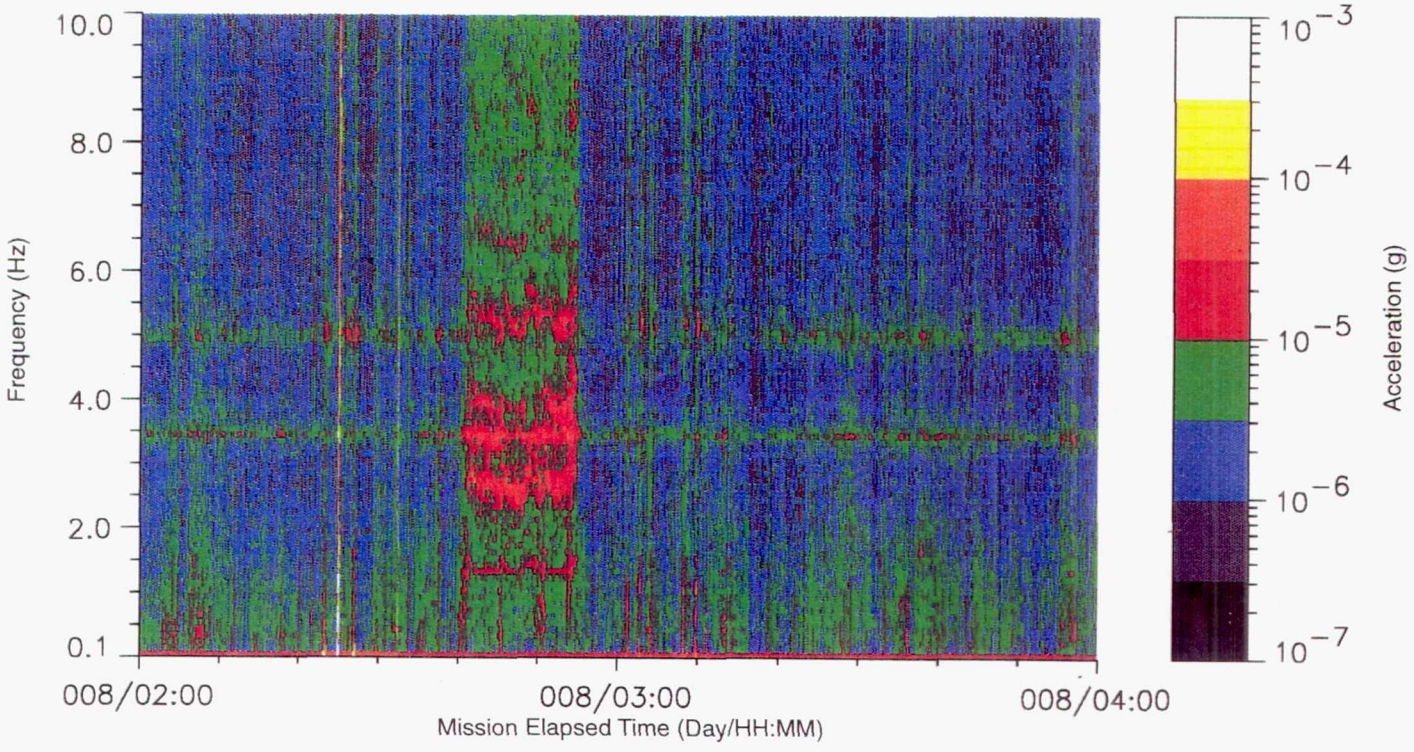

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Figure C-91 ATLAS-3 Locker Door MF28E, Vector Magnitude

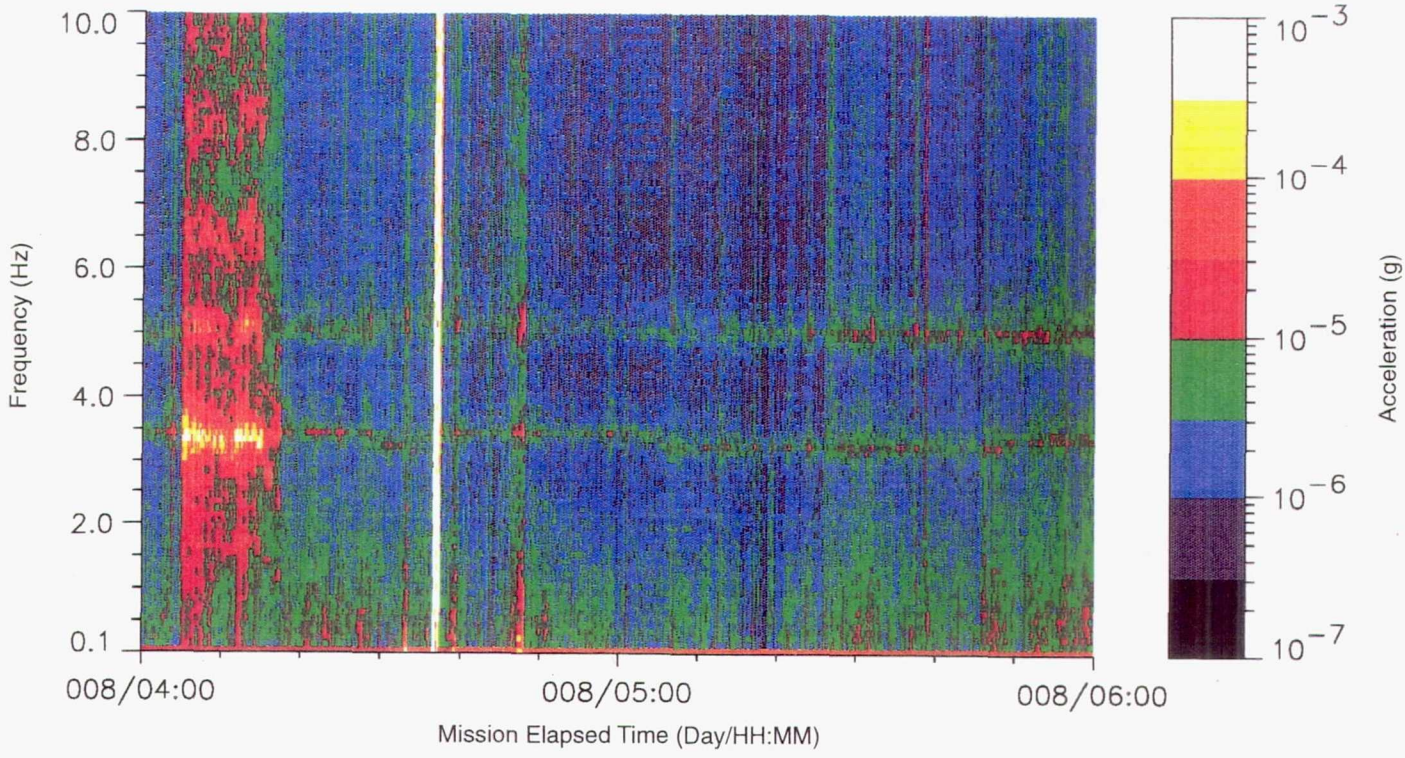

Figure C-92 ATLAS-3 Locker Door MF28E, Vector Magnitude

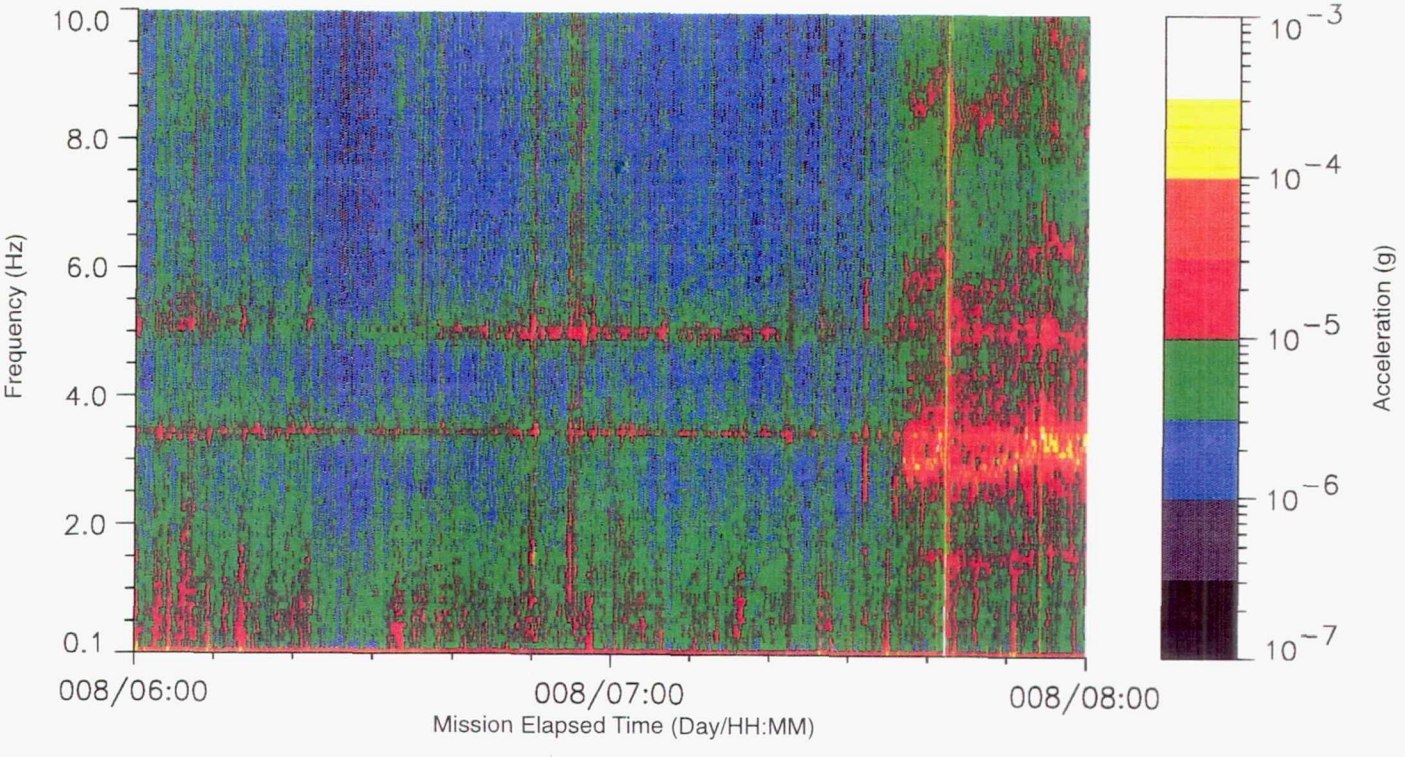

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Figure C-93 ATLAS-3 Locker Door MF28E, Vector Magnitude

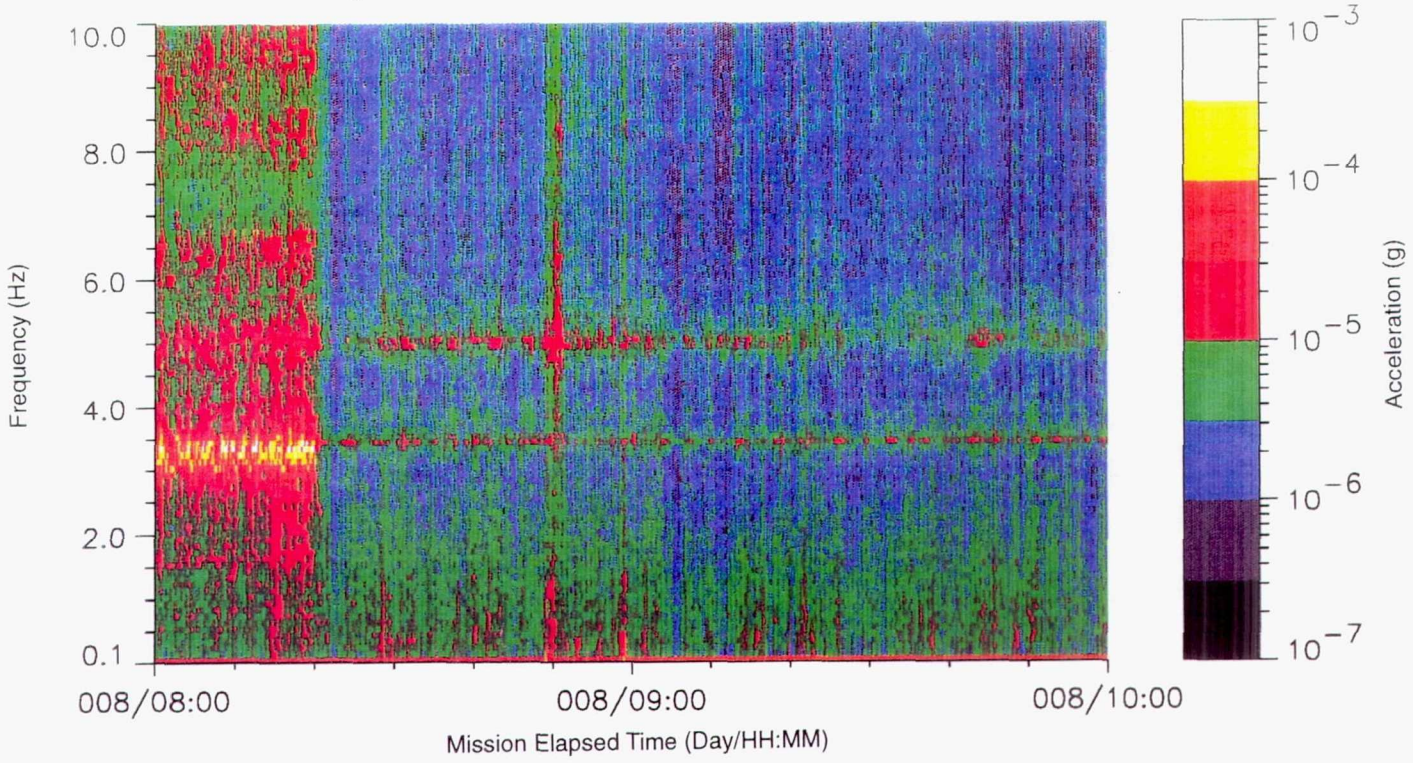

Figure C-94 ATLAS-3 Locker Door MF28E, Vector Magnitude

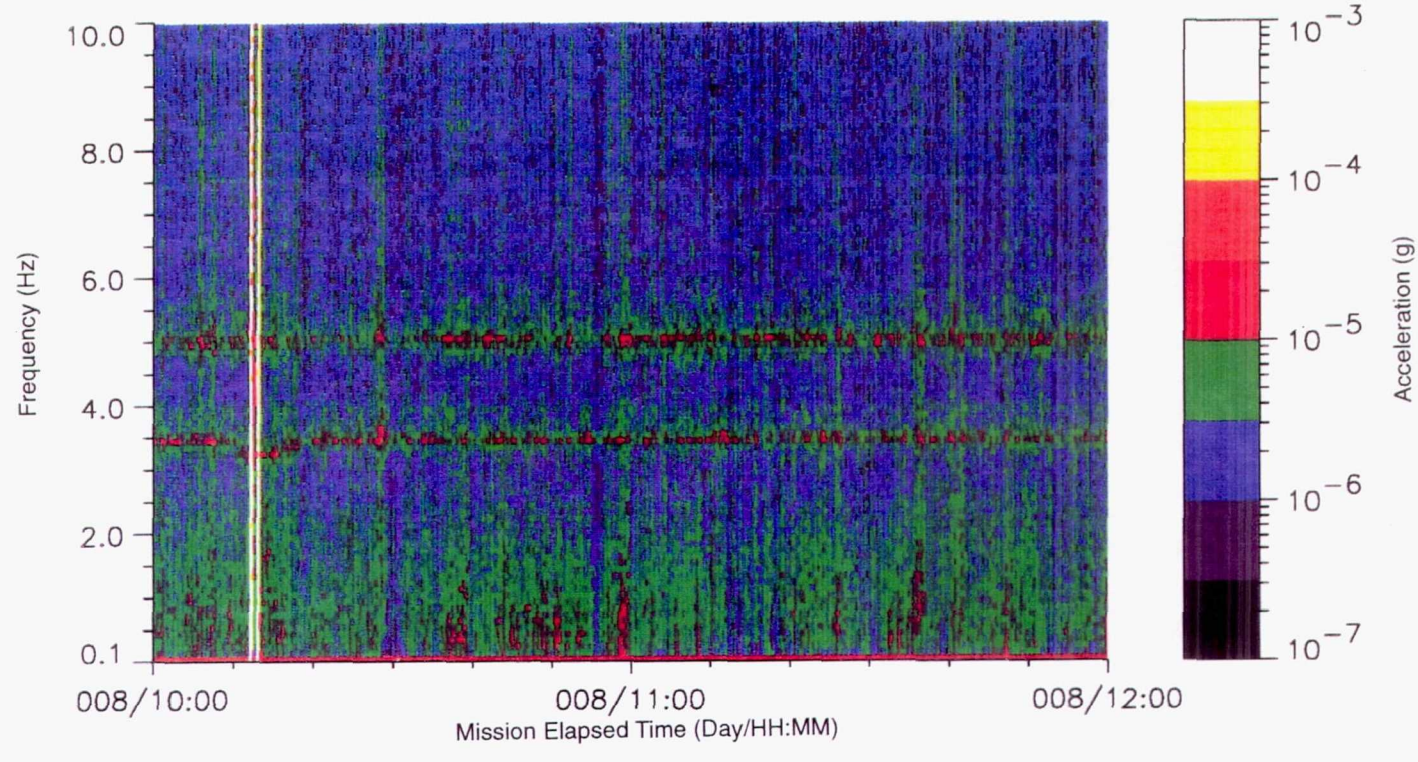

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Figure C-95 ATLAS-3 Locker Door MF28E, Vector Magnitude

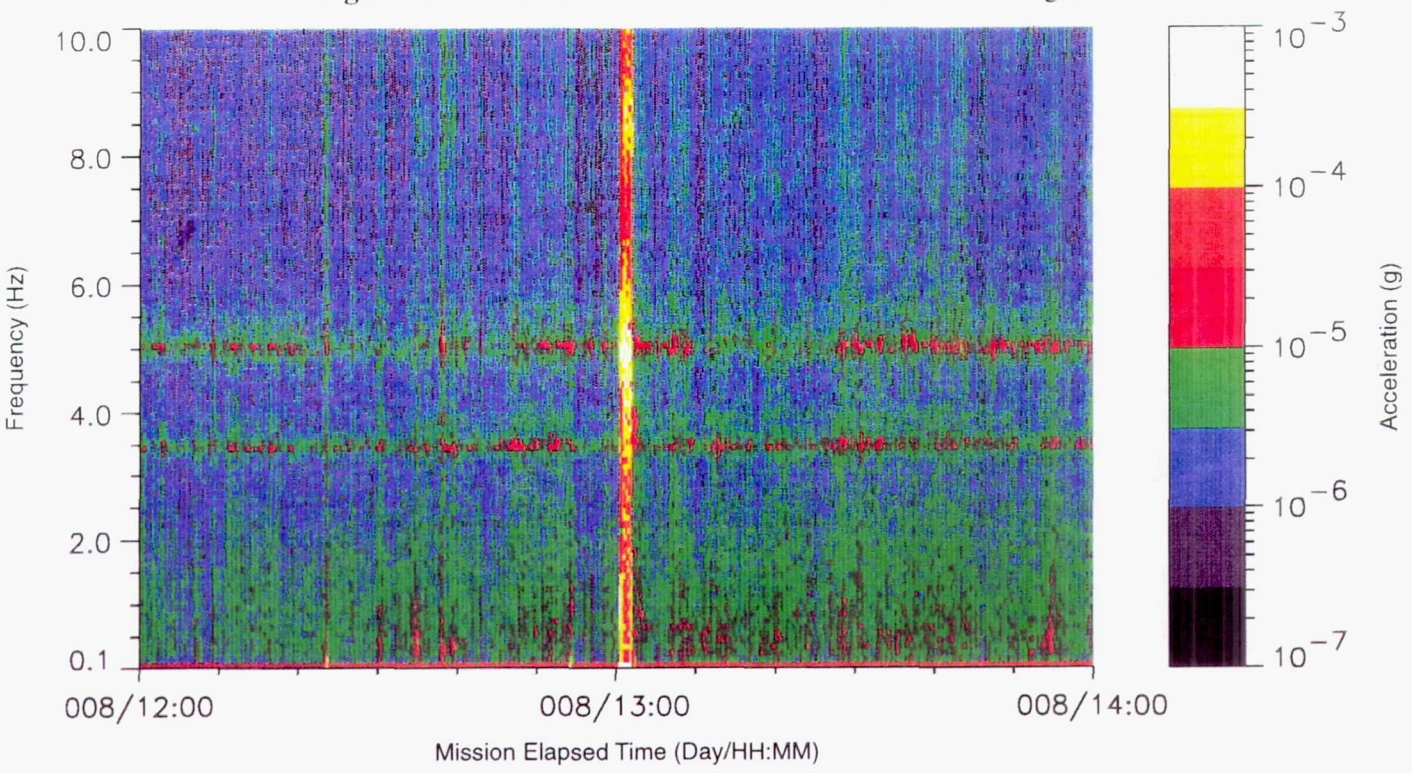

Figure C-96 ATLAS-3 Locker Door MF28E, Vector Magnitude

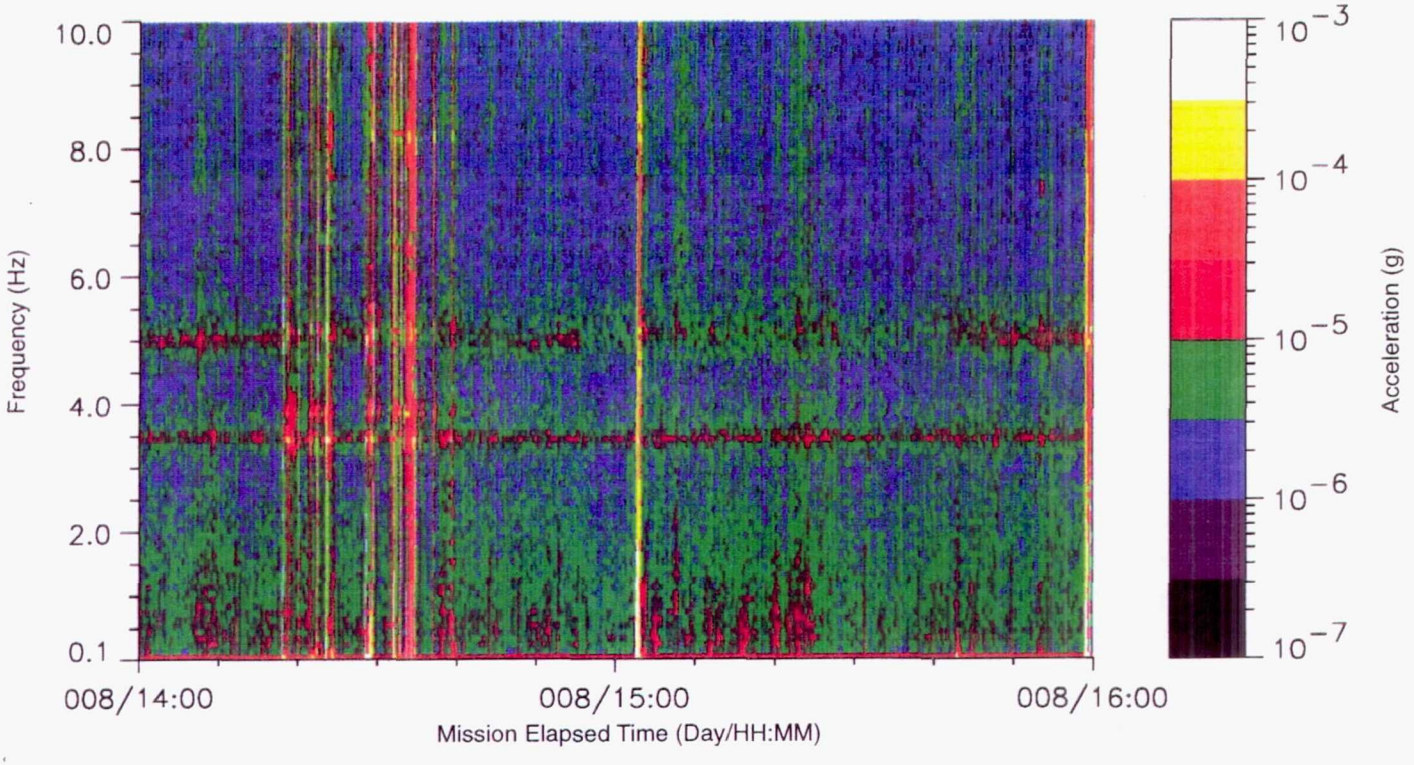

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Figure C-97 ATLAS-3 Locker Door MF28E, Vector Magnitude

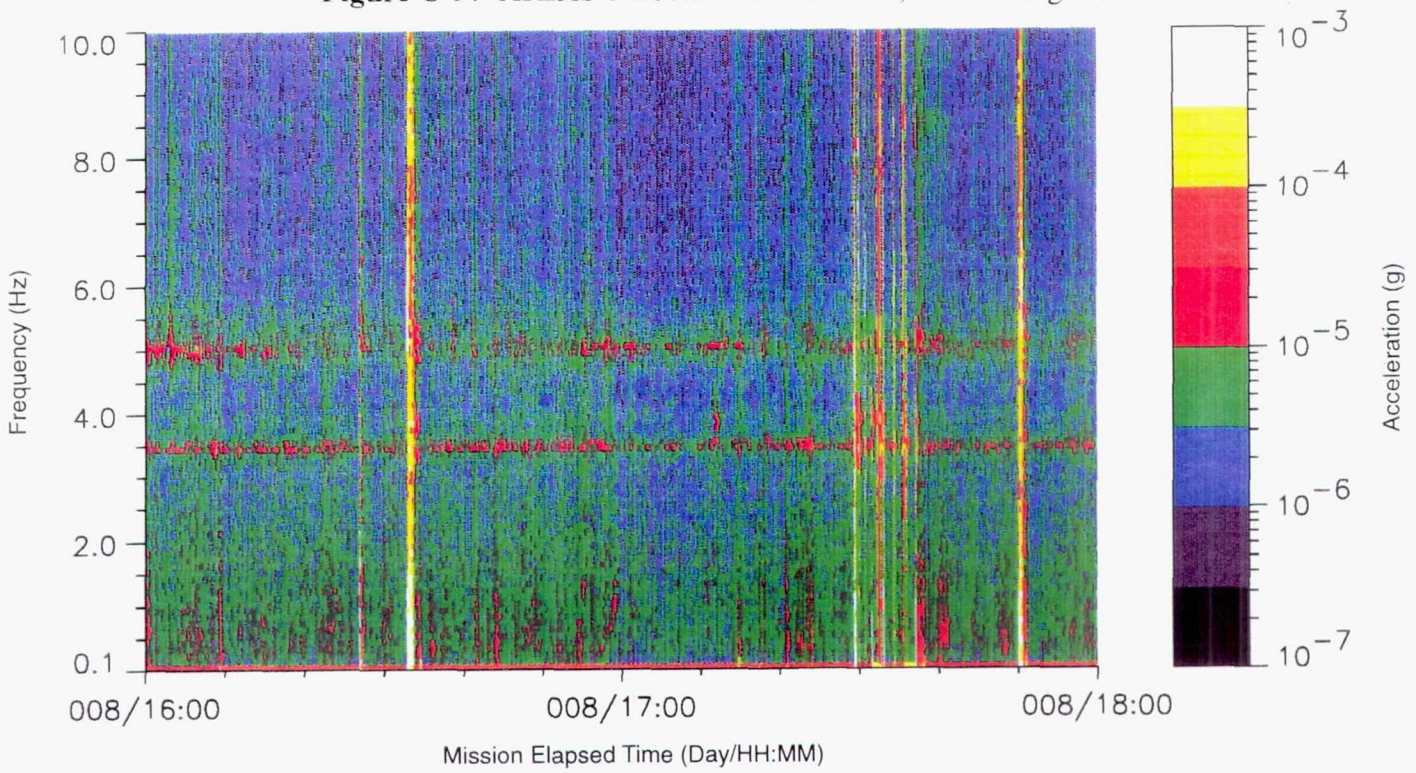

Figure C-98 ATLAS-3 Locker Door MF28E, Vector Magnitude

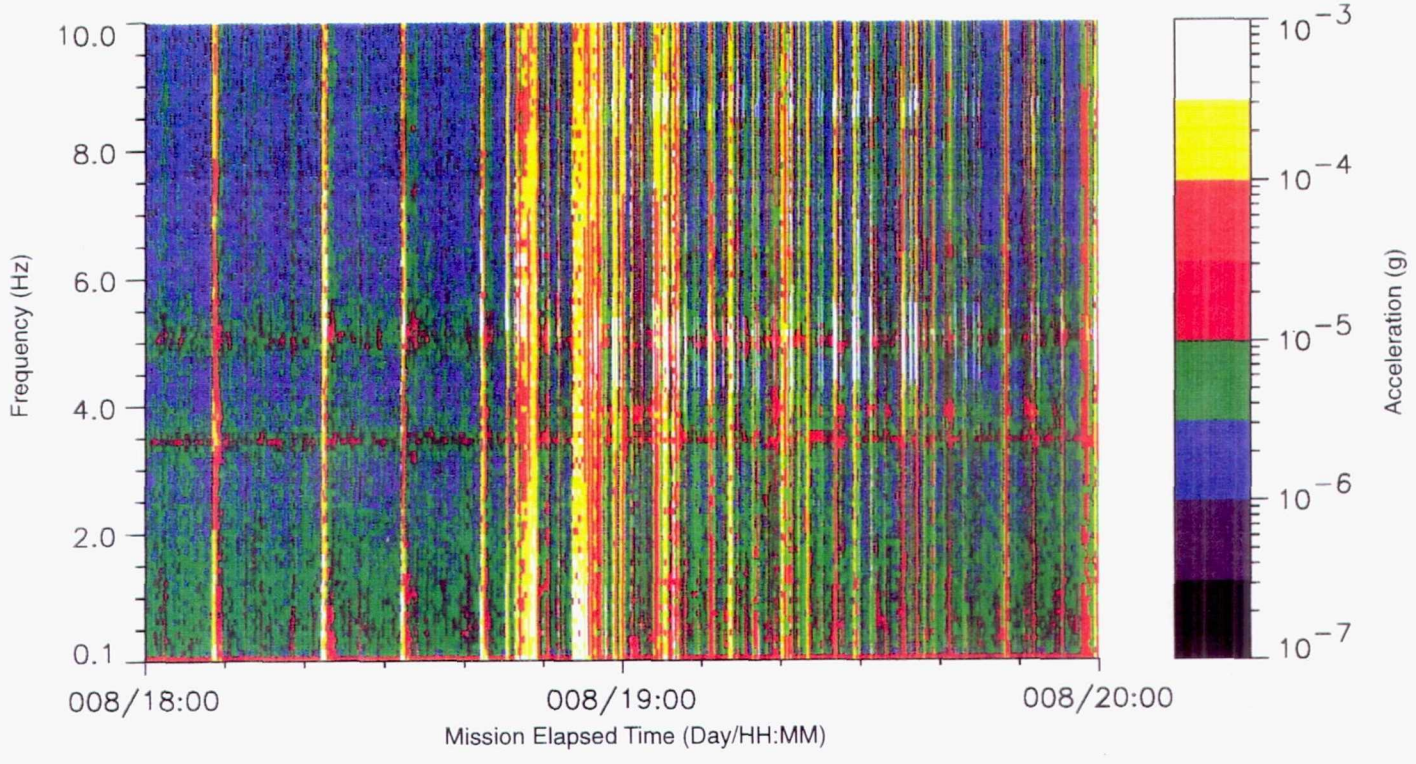

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Figure C-99 ATLAS-3 Locker Door MF28E, Vector Magnitude

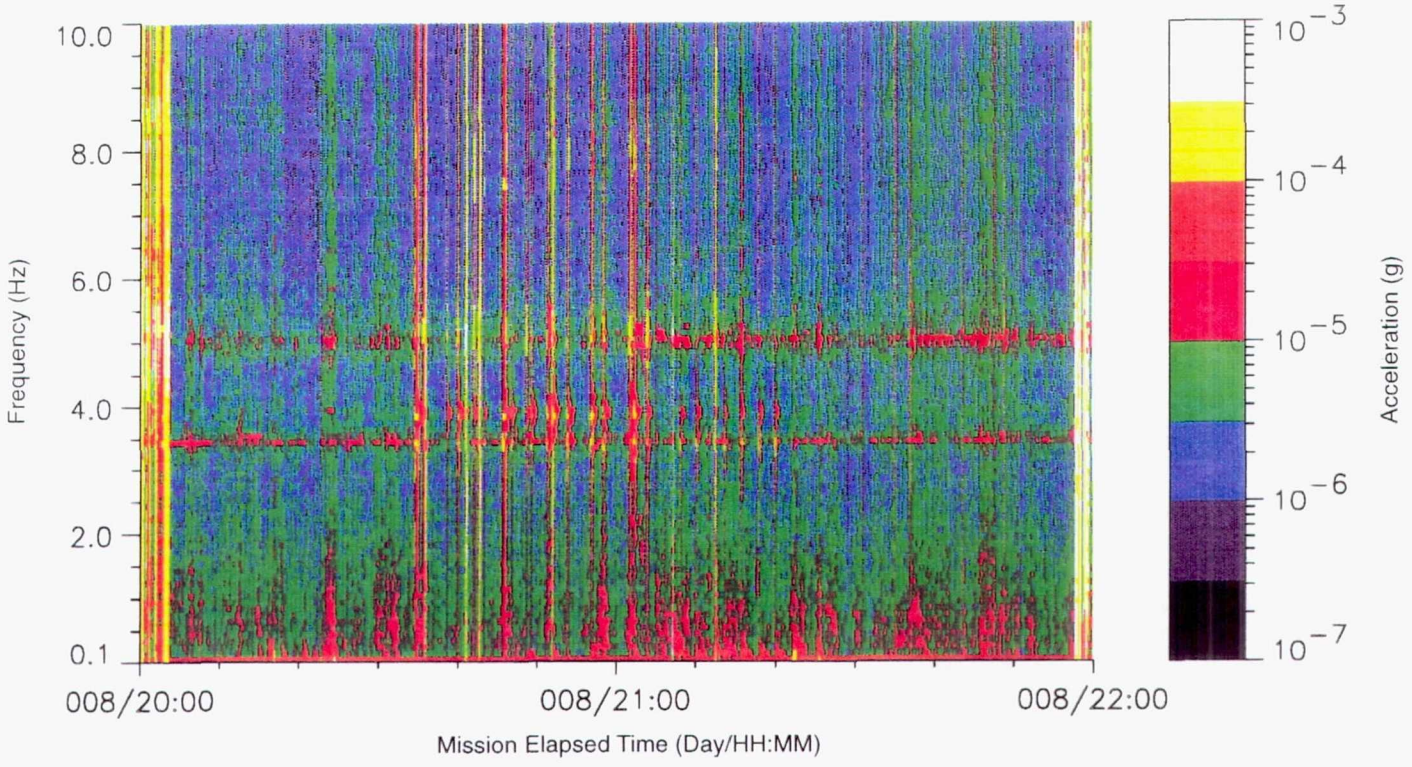

Figure C-100 ATLAS-3 Locker Door MF28E, Vector Magnitude

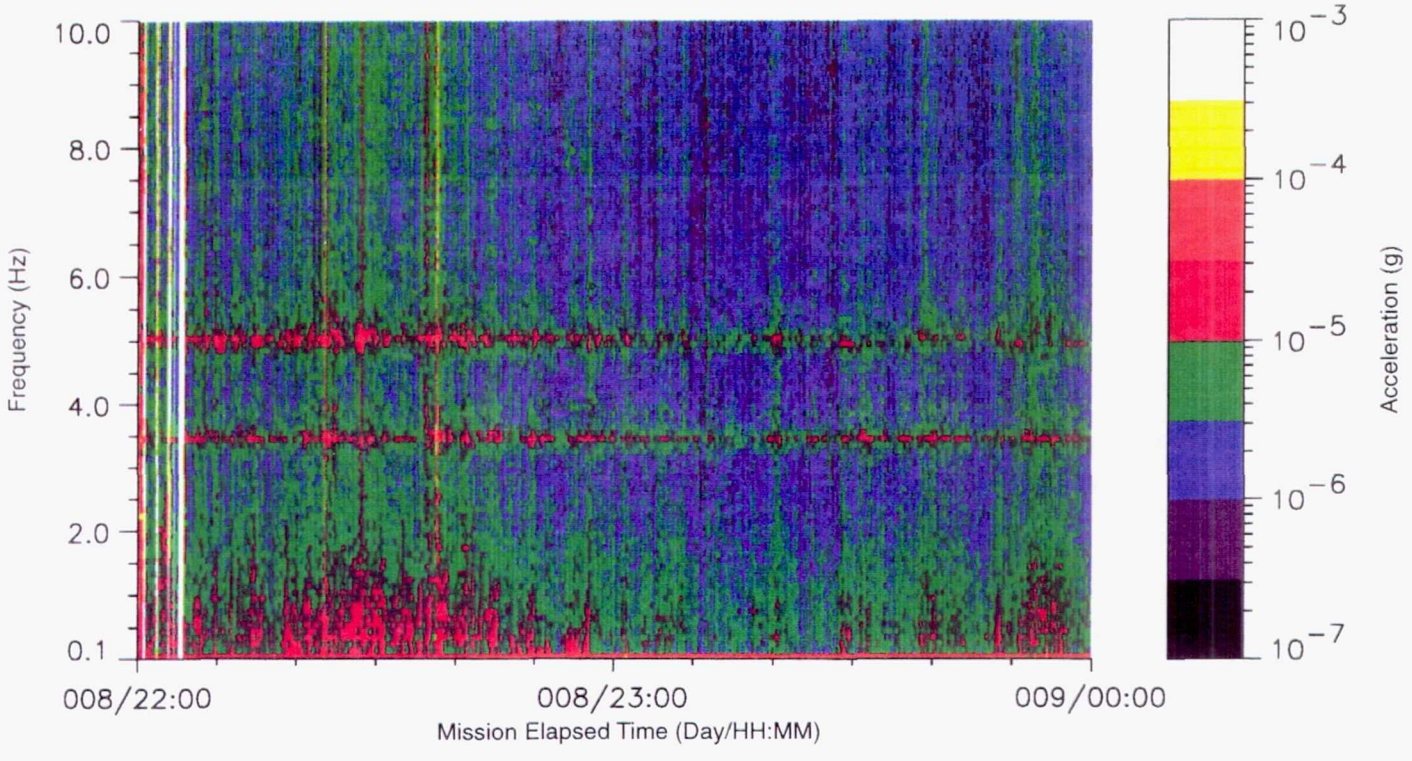

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Figure C-101 ATLAS-3 Locker Door MF28E, Vector Magnitude

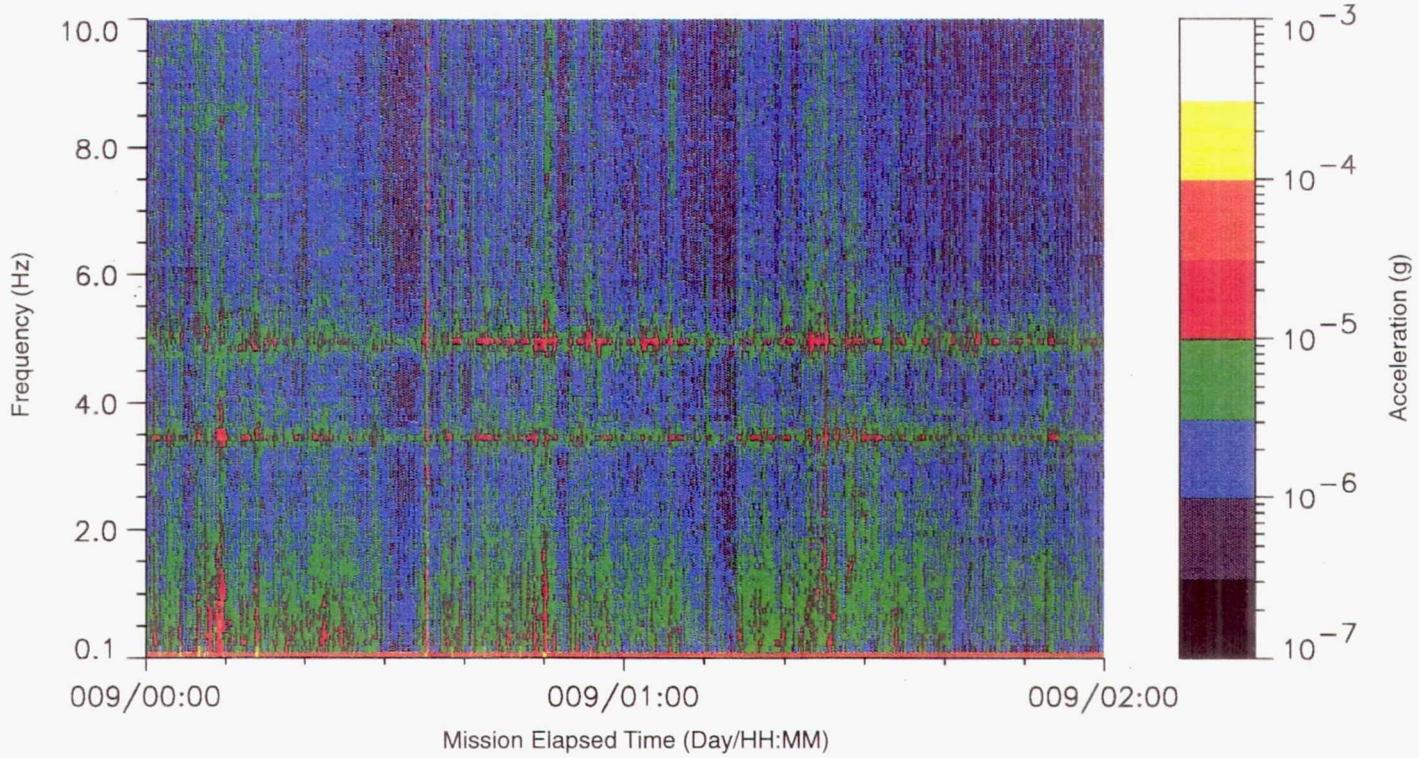

Figure C-102 ATLAS-3 Locker Door MF28E, Vector Magnitude

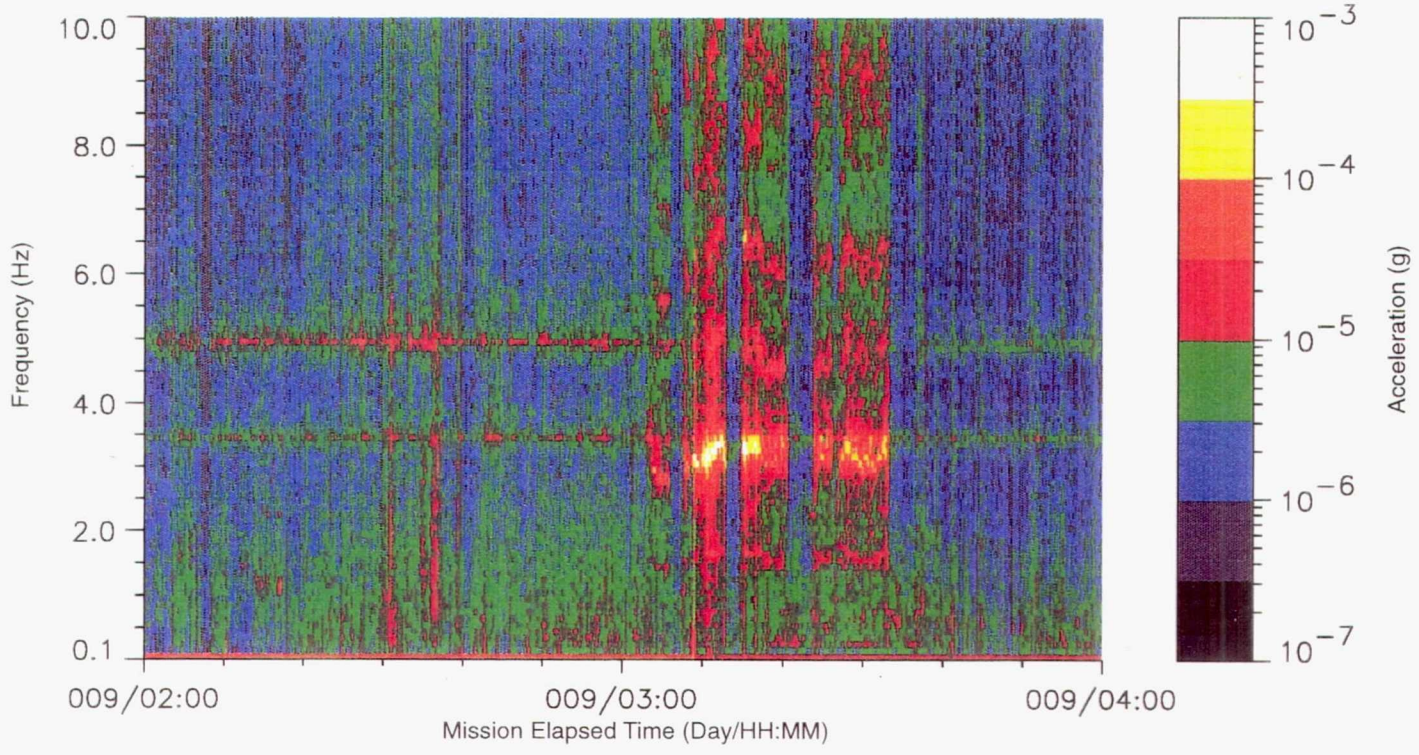

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Figure C-103 ATLAS-3 Locker Door MF28E, Vector Magnitude

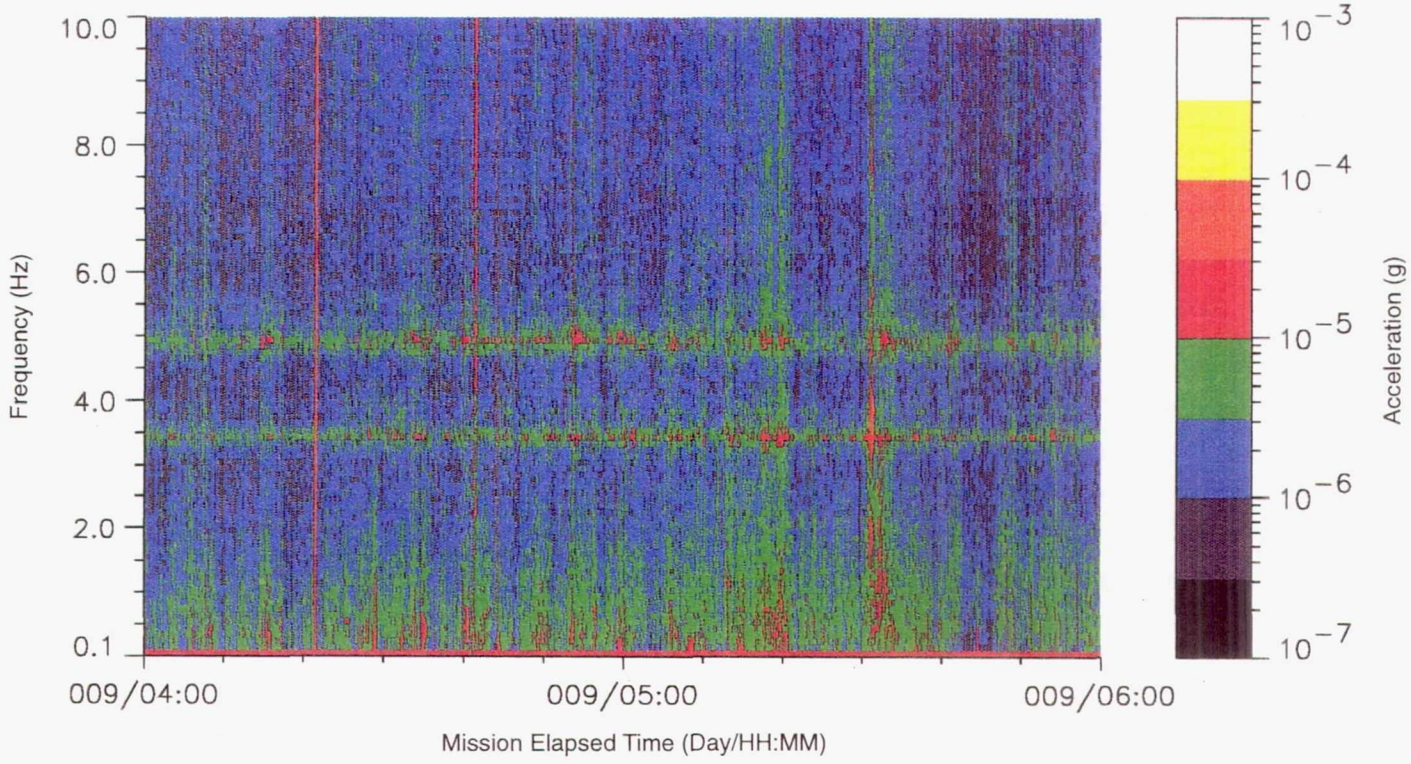

Figure C-104 ATLAS-3 Locker Door MF28E, Vector Magnitude

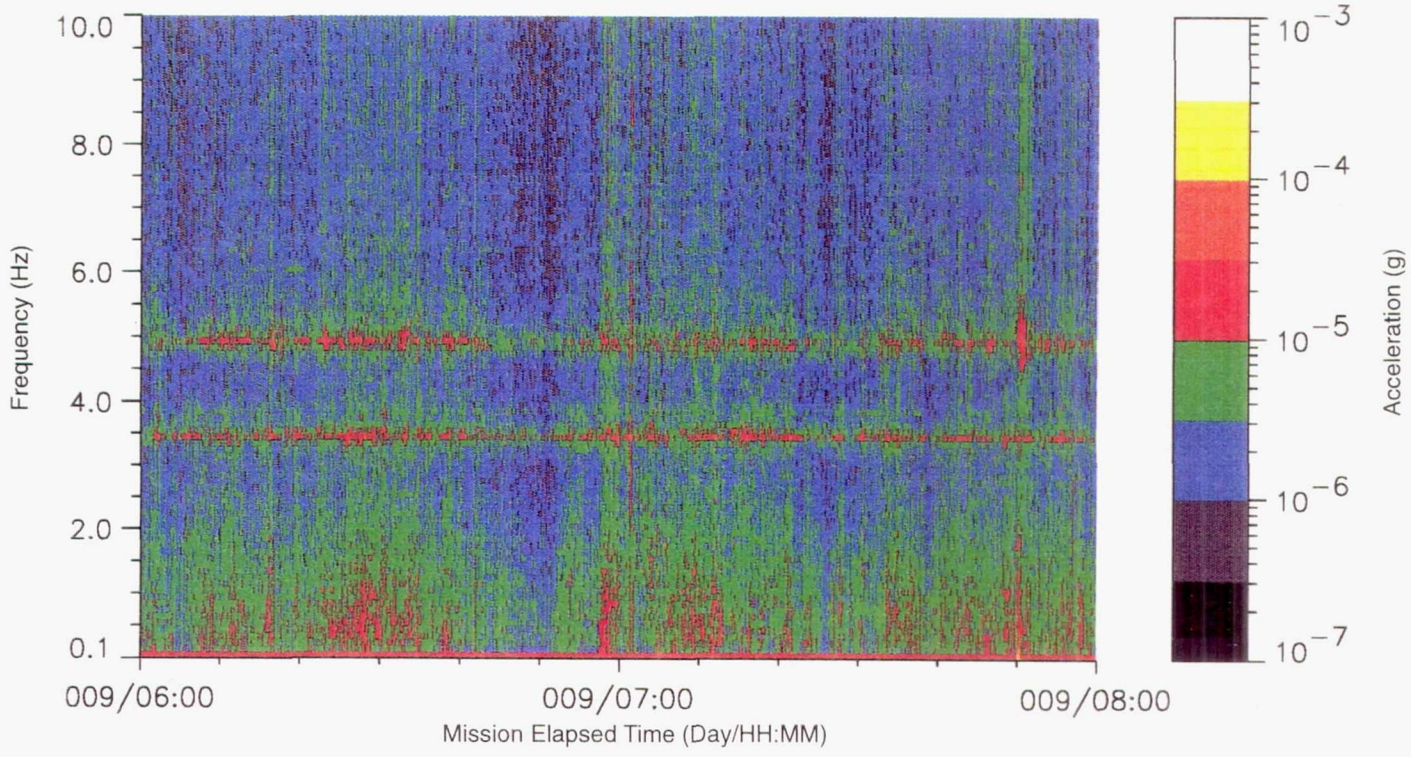

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Figure C-105 ATLAS-3 Locker Door MF28E, Vector Magnitude

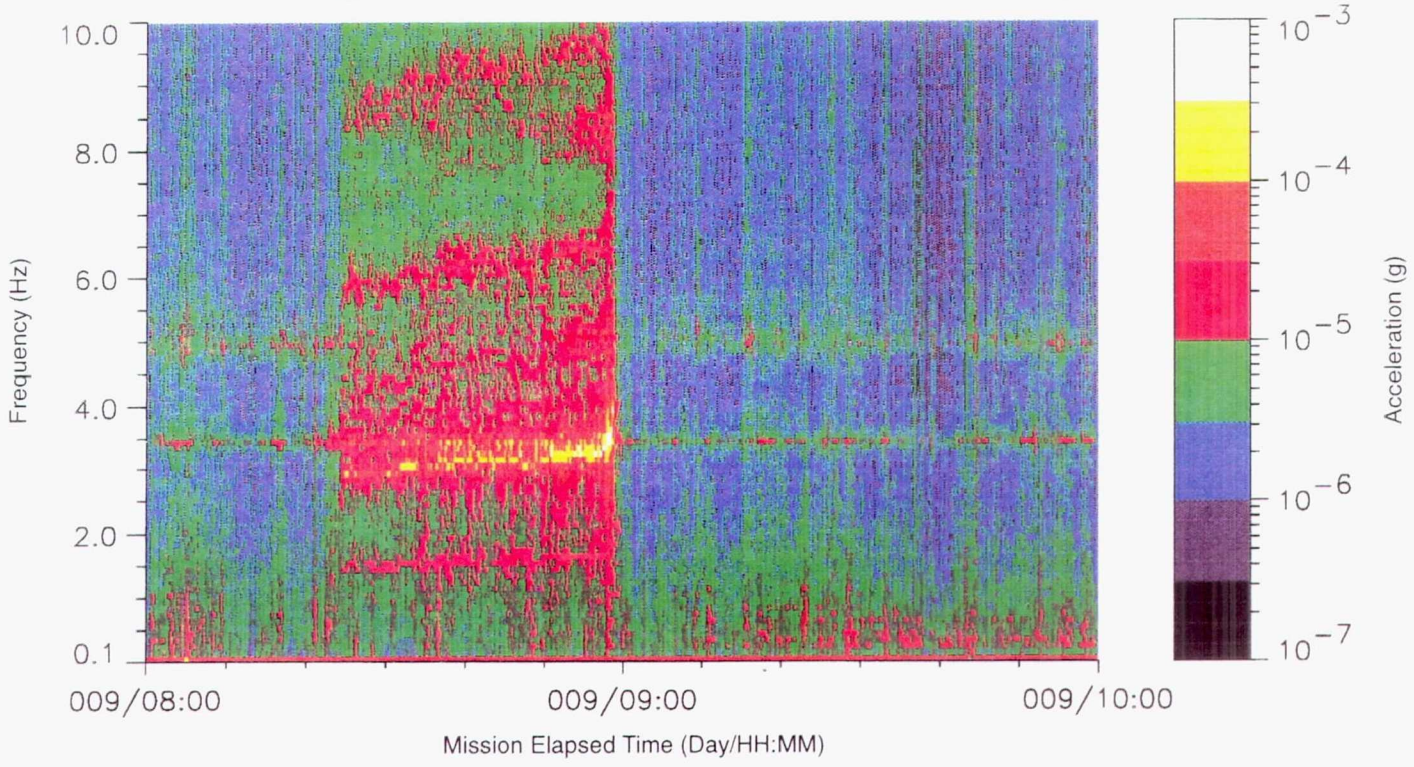

Figure C-106 ATLAS-3 Locker Door MF28E, Vector Magnitude

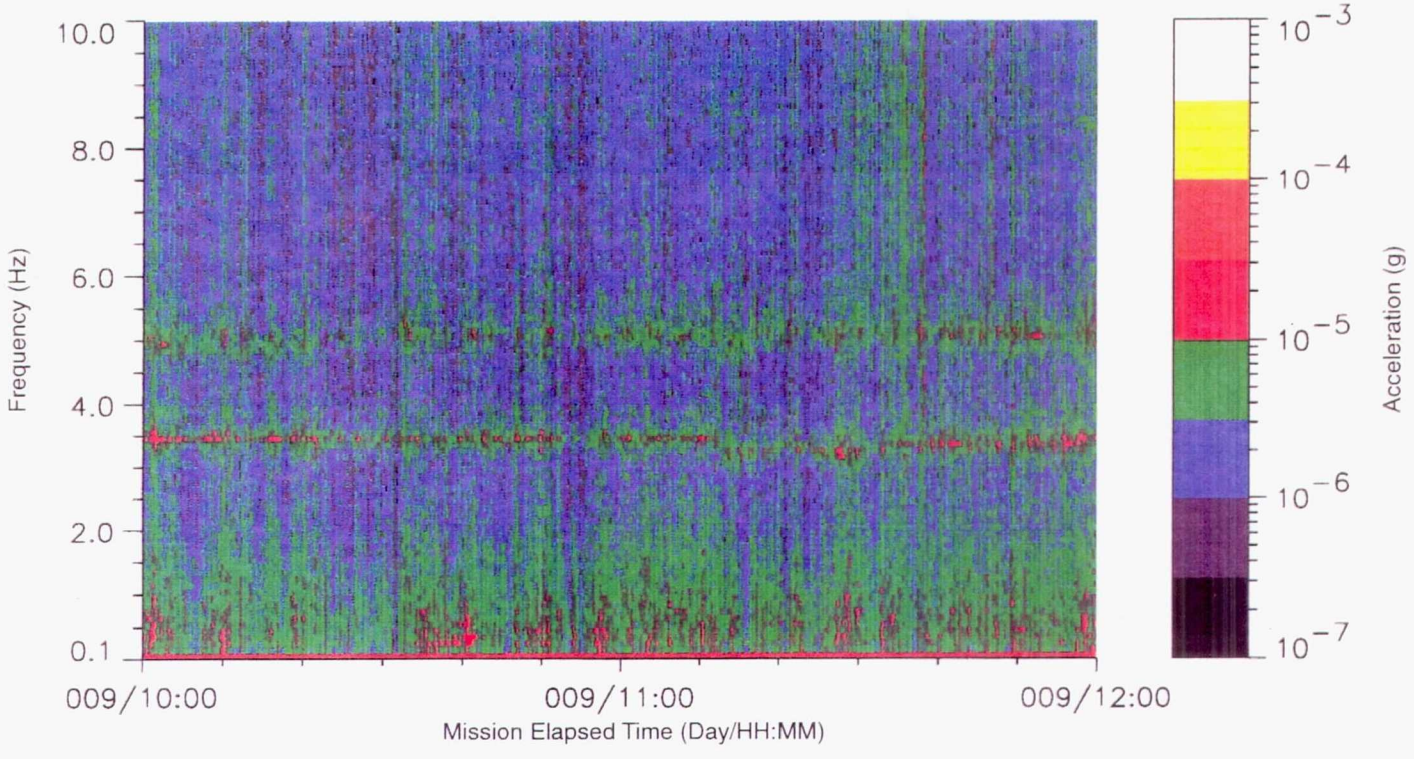

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Figure C-107 ATLAS-3 Locker Door MF28E, Vector Magnitude

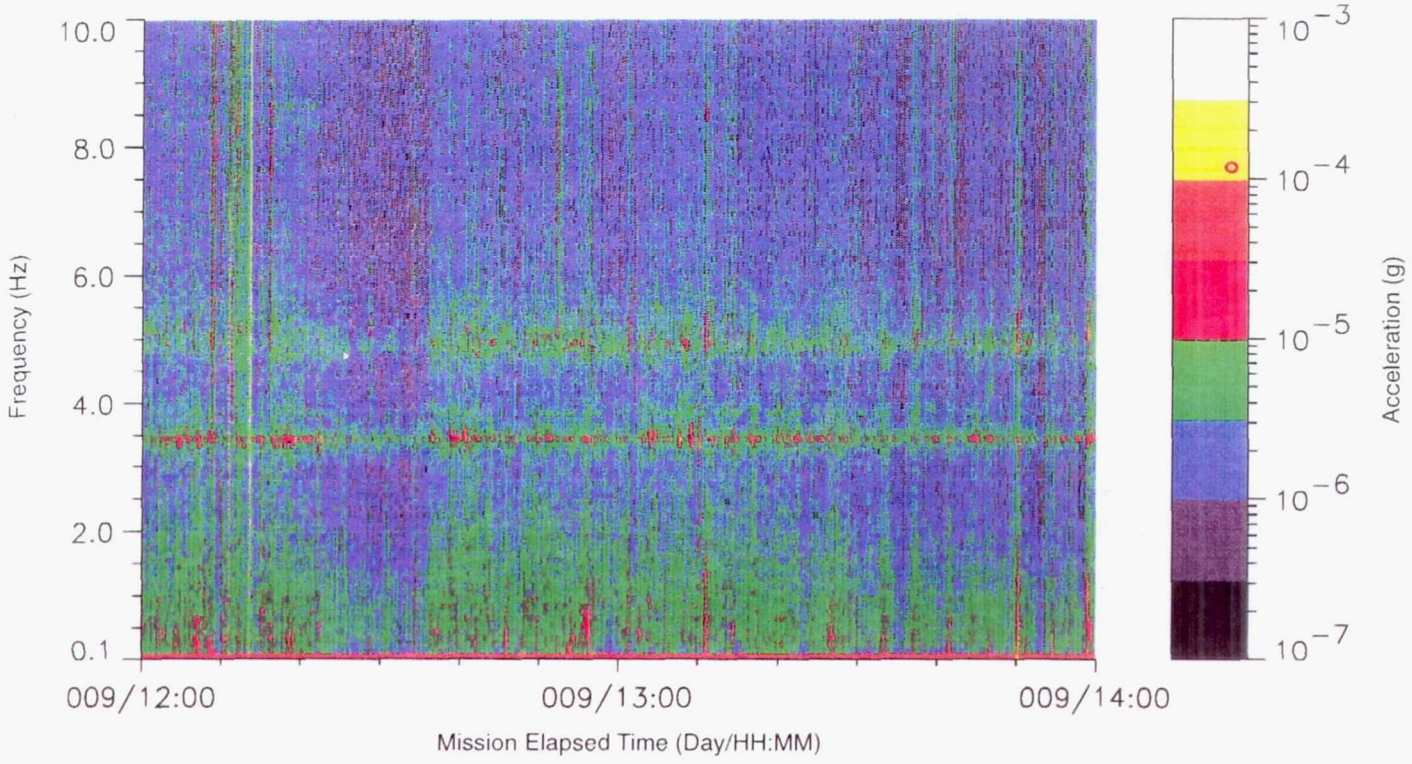

Figure C-108 ATLAS-3 Locker Door MF28E, Vector Magnitude

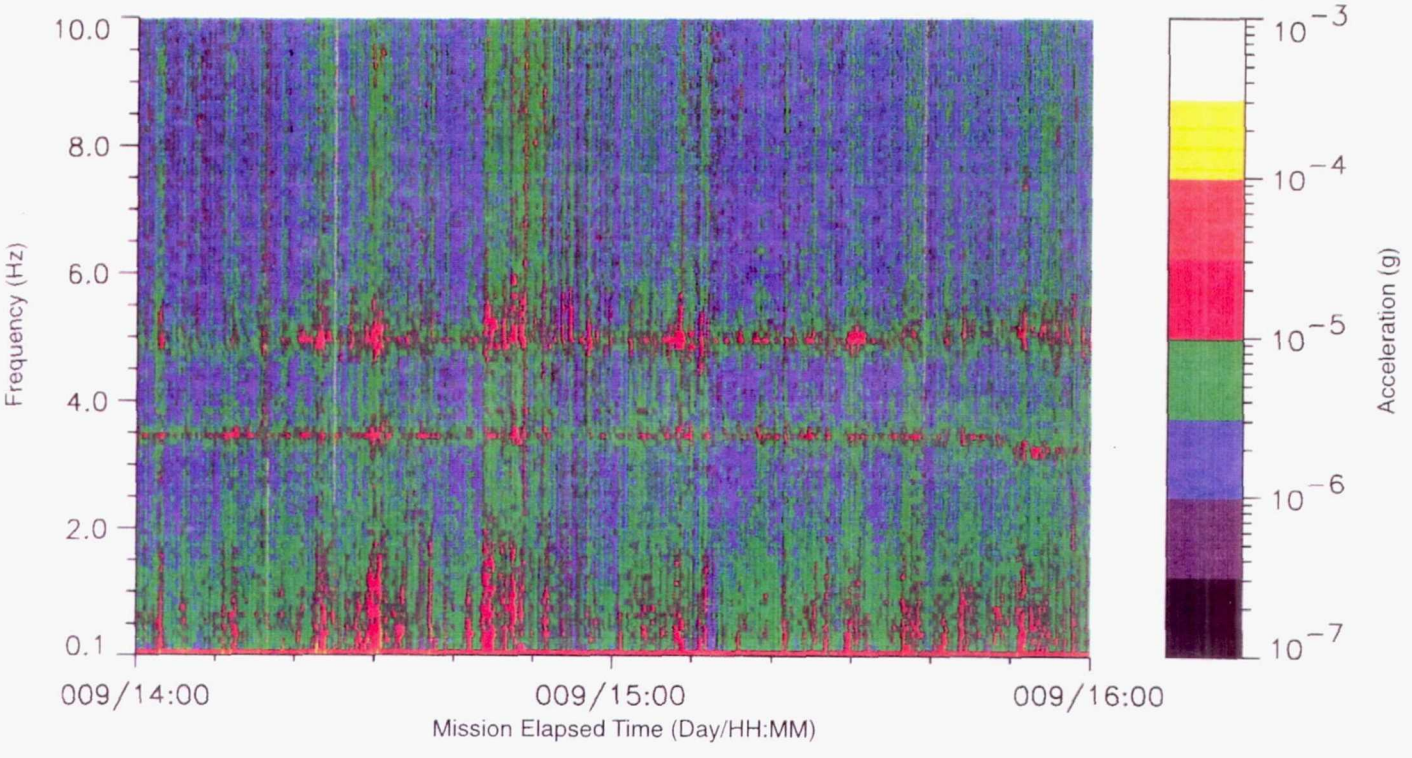

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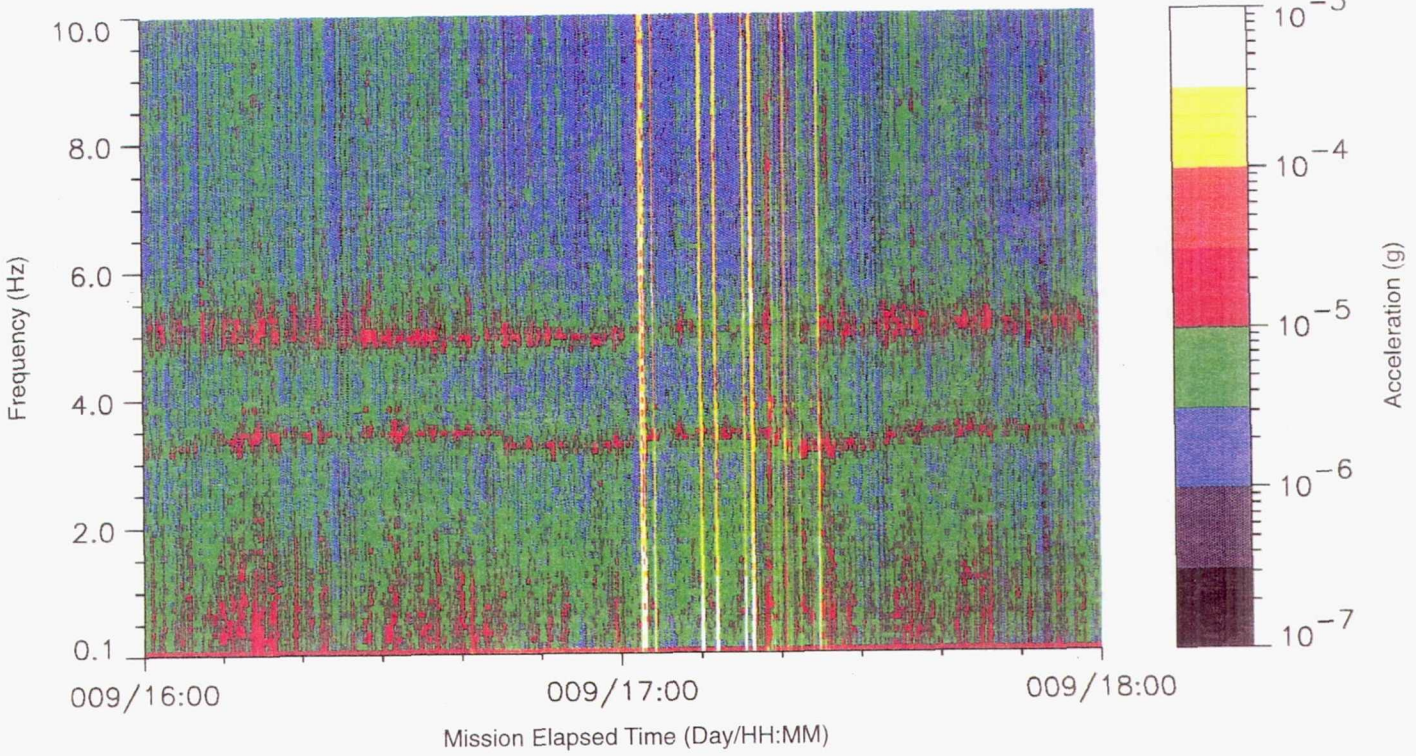
Figure C-109 ATLAS-3 Locker Door MF28E, Vector Magnitude



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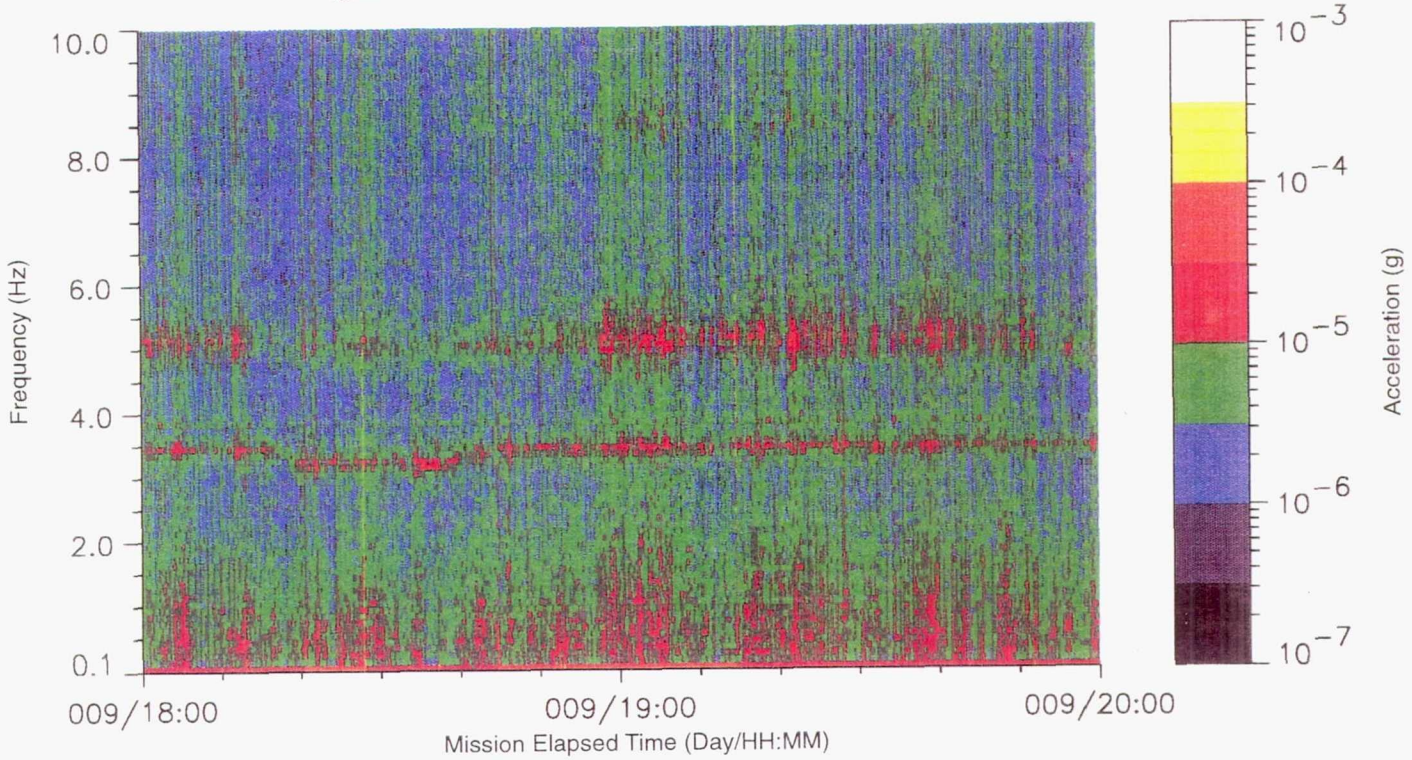

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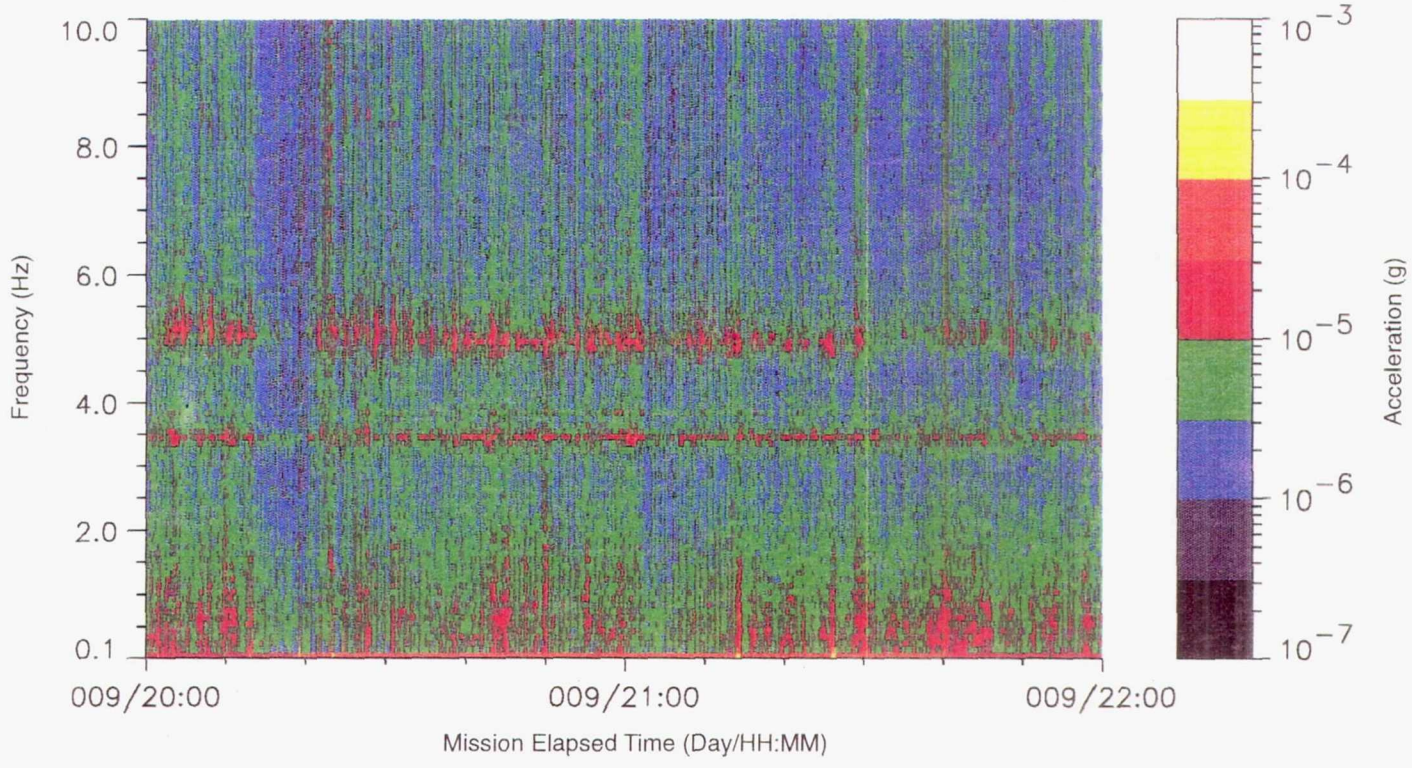
Figure C-111 ATLAS-3 Locker Door MF28E, Vector Magnitude



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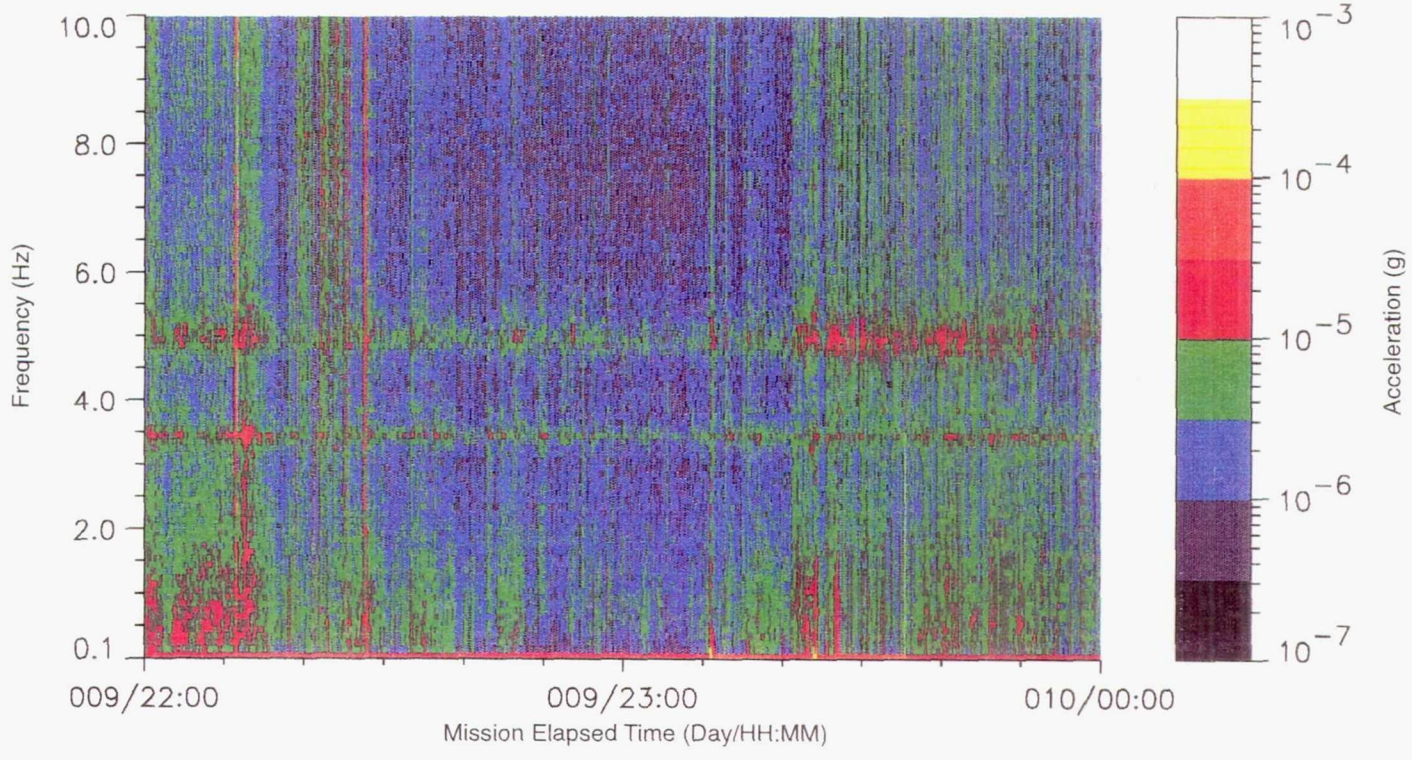

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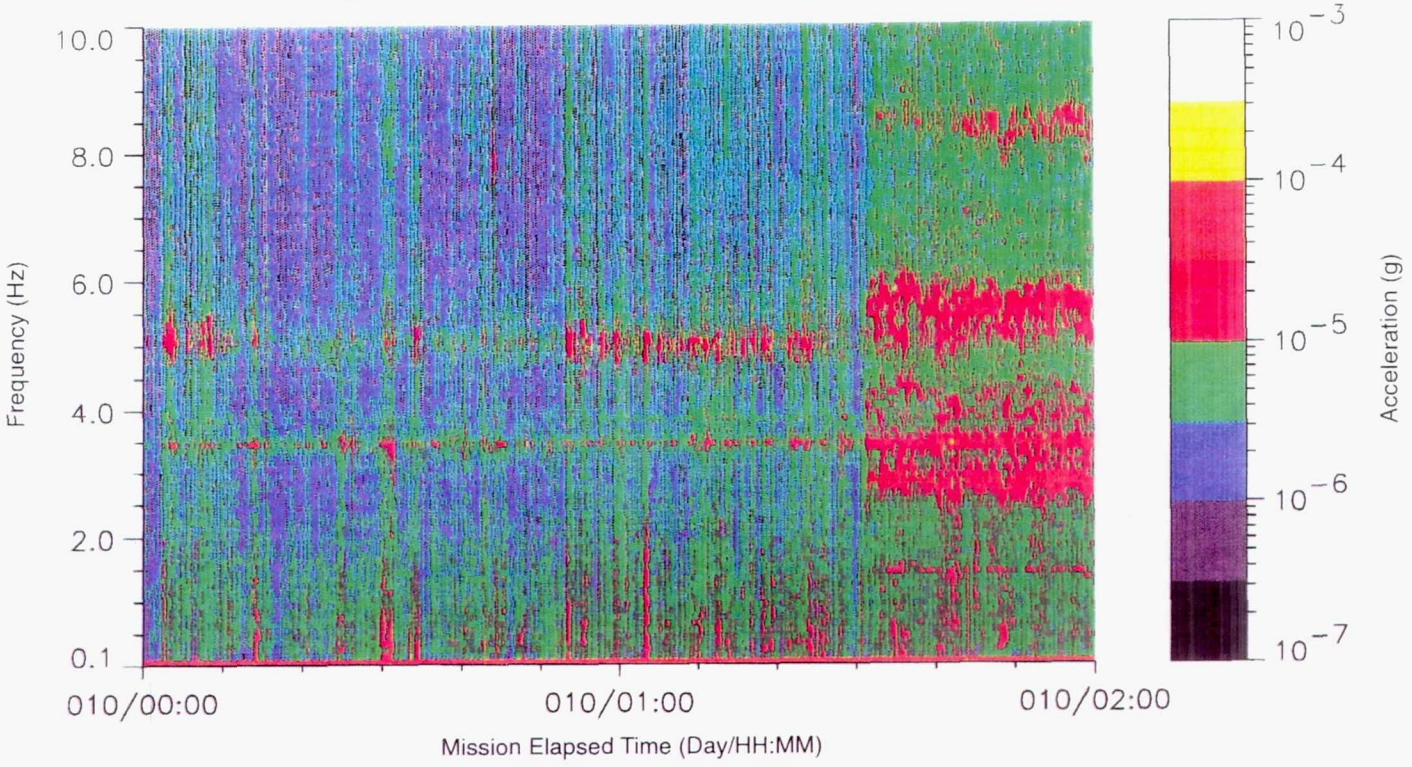
Figure C-113 ATLAS-3 Locker Door MF28E, Vector Magnitude



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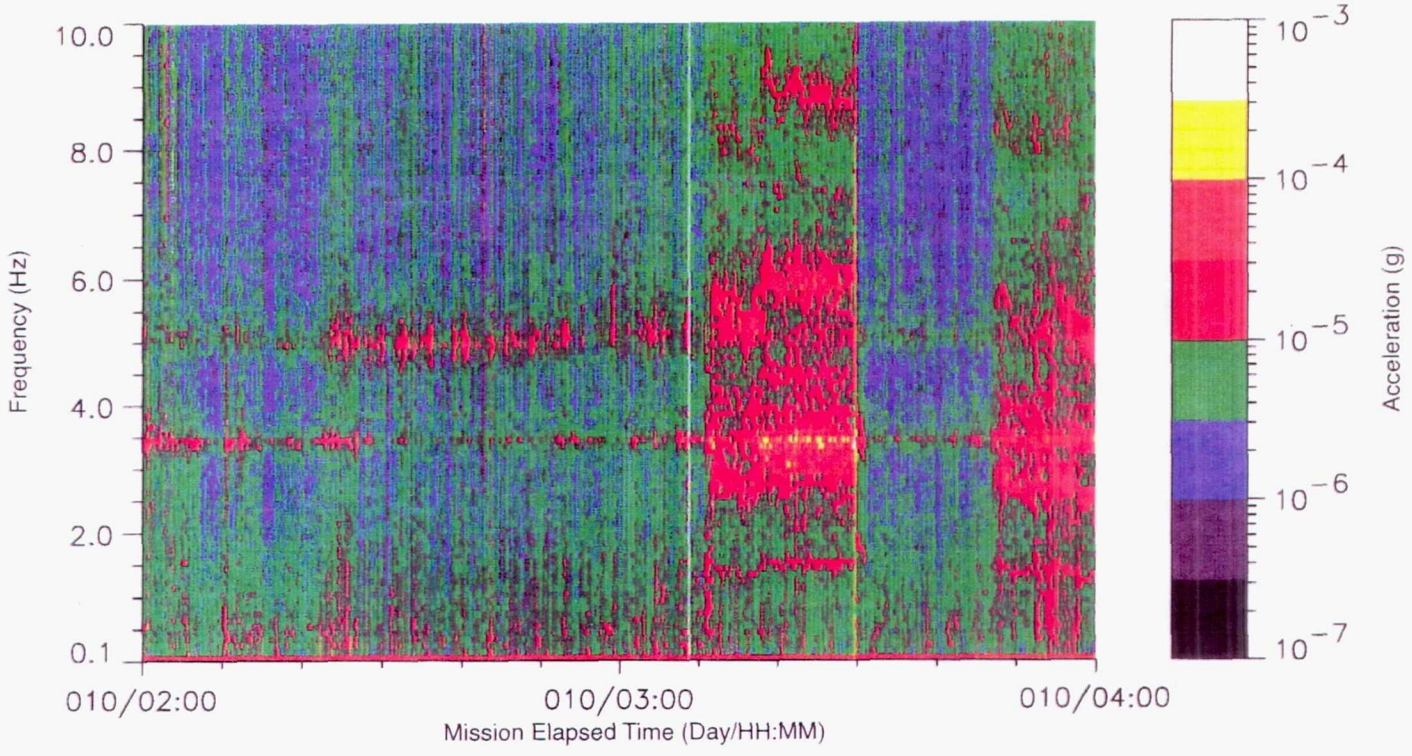

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Figure C-115 ATLAS-3 Locker Door MF28E, Vector Magnitude

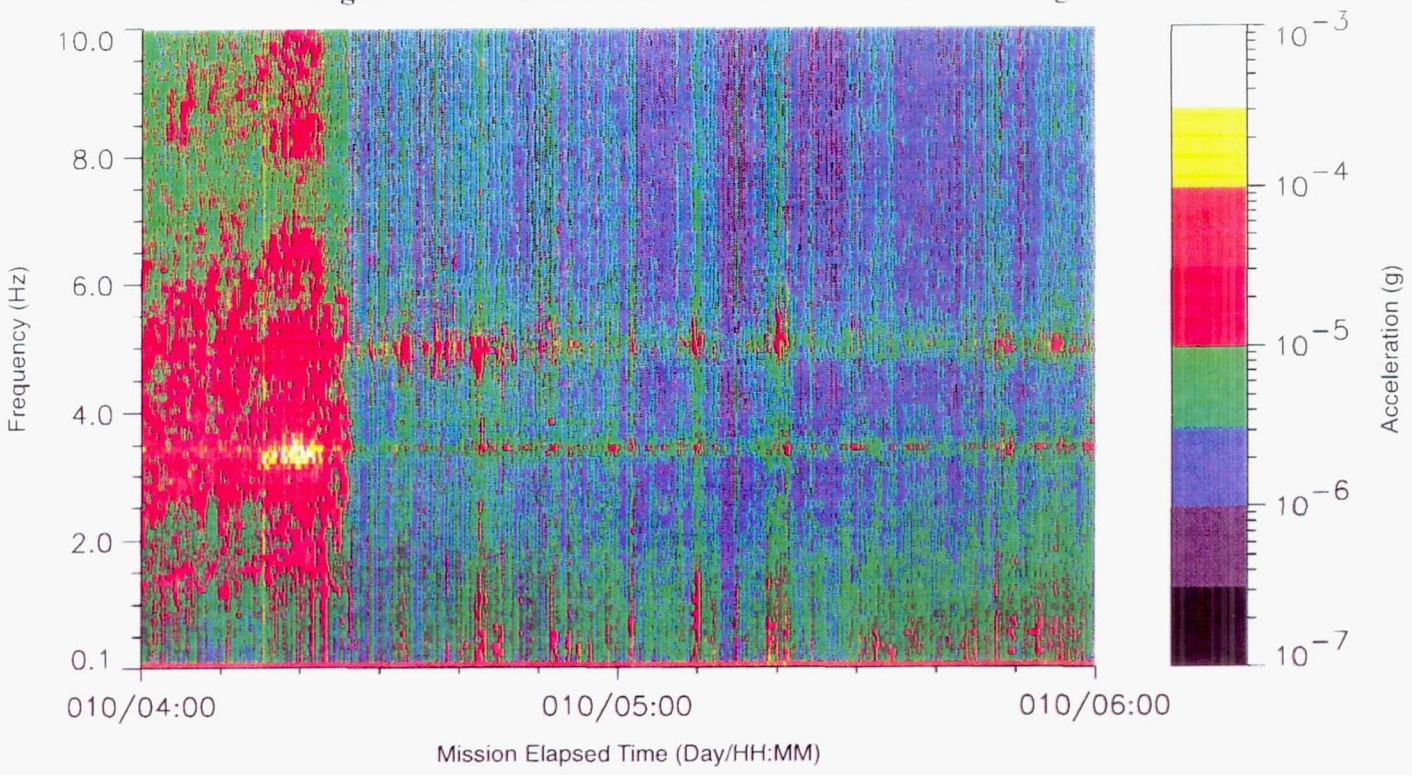
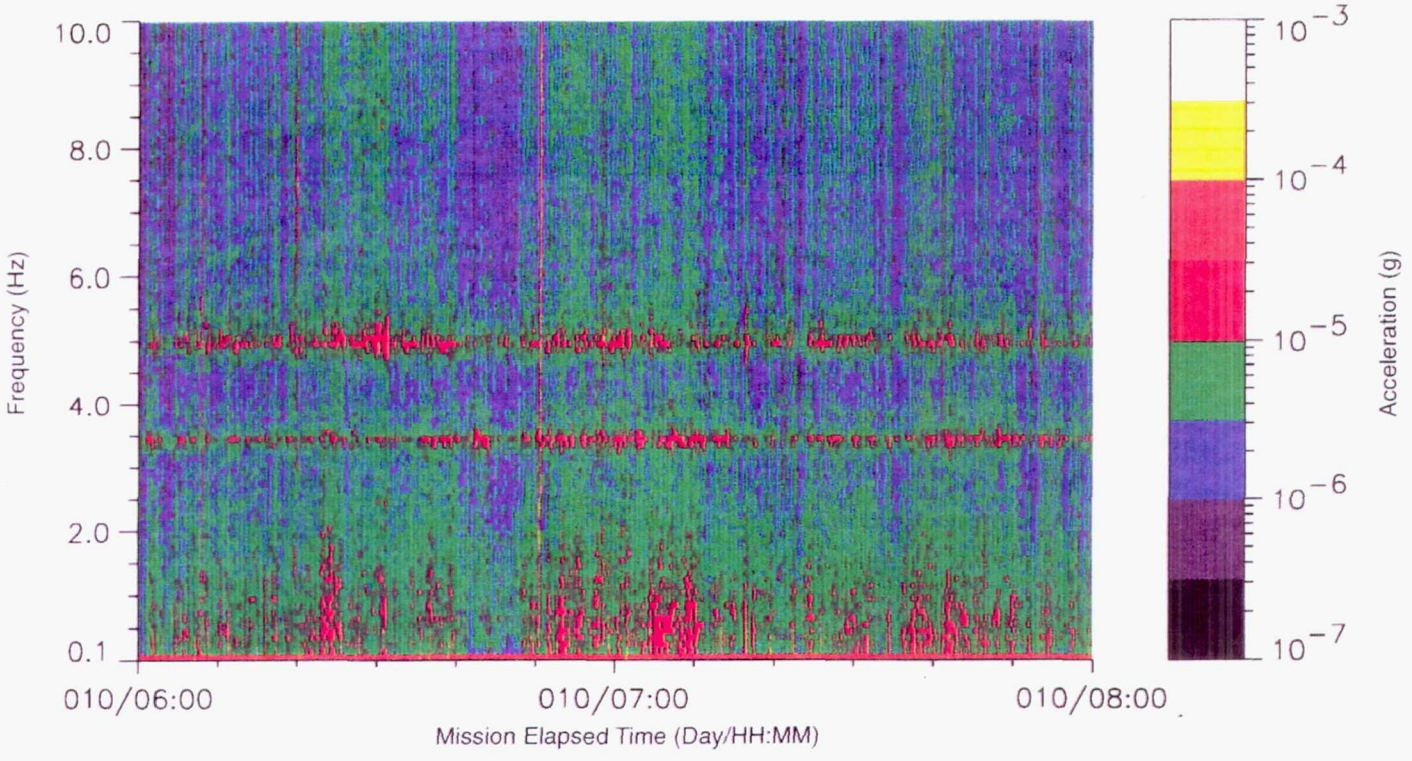


Figure C-116 ATLAS-3 Locker Door MF28E, Vector Magnitude



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13. ABSTRACT ***(Maximum 200 words)***

Experiments flown in the middeck of Atlantis during the STS–66 mission were supported by the Space Acceleration Measurement System (SAMS). In particular, the three triaxial SAMS sensor heads collected data in support of protein crystal growth experiments. Data collected during STS–66 are reviewed in this report. The STS–66 SAMS data represent the microgravity environment in the 0.01 Hz to 10 Hz range. Variations in the environment related to differing levels of crew activity are discussed in the report. A comparison is made among times when the crew was quiet during a public affairs conference, working quietly, and exercising. These levels of activity are also compared to levels recorded by a SAMS unit in the Spacelab on Columbia during the STS–65 mission.

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